



Cisco IOS XR Interface and Hardware Component Command Reference for the Cisco CRS Router

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Text Part Number: OL-24769-01

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Preface

This command reference describes the Cisco IOS XR Interfaces commands. The preface for the *Cisco IOS XR Interface and Hardware Component Command Reference for the Cisco CRS Router* contains the following sections:

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- [Obtaining Documentation and Submitting a Service Request](#), page xix

Changes to This Document

[Changes to This Document](#), on page xix lists the technical changes made to this document since it was first published.

Revision	Date	Change Summary
OL-24769-01	May 25, 2011	Added ATM commands chapter.
OL-24769-01	April 30, 2011	Initial release of this document.

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ATM Commands on the Cisco IOS XR Software

This module provides command line interface (CLI) commands for configuring ATM on your router.

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atm address-registration

To enable the router to engage in address registration and callback functions with the Interim Local Management Interface (ILMI), use the **atm address-registration** command in interface configuration mode. To disable ILMI address registration functions, use the **no** form of this command.

atm address-registration

no atm address-registration

Syntax Description This command has no keywords or arguments.

Command Default If ILMI is configured on a PVC and its host ATM interface, then address registration and callback function enabled on the router by default.

If ILMI is not configured on a PVC and its host ATM interface, then address registration and callback functionality is disabled on the router and must be enabled with the **atm address-registration** command.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	Release 3.9.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note The **atm address-registration** command is effective only when an ILMI PVC is created under the physical ATM interface.

Task ID	Task ID	Operations
	atm	read, write

Examples The following example shows how to enable the ATM interface 0 in slot 6 to register its address:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
```

```
RP/0/RP0/CPU0:router(config-if)# atm address-registration
```


atm ilmi-config disable

To disable Interim Local Management Interface (ILMI) on an ATM interface, use the **atm ilmi-config disable** command in interface configuration mode. To re-enable ILMI on an ATM interface, use the **no** form of this command.

atm ilmi-config disable

no atm ilmi-config disable

Syntax Description This command has no keywords or arguments.

Command Default If an ILMI PVC is configured on the ATM interface, then ILMI is automatically enabled on the ATM interface that hosts that PVC.

If an ILMI PVC is not configured on the ATM interface, then ILMI is disabled by default on the ATM interface.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	Release 3.9.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note The **atm ilmi-config disable** command is effective only when an ILMI PVC is created under the physical ATM interface.

Task ID	Task ID	Operations
	atm	read, write

Examples The following example shows how to disable ILMI on an ATM interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# atm ilmi-config disable
```

The following example shows how to re-enable ILMI on an ATM interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# no atm ilmi-config disable
```

Related Commands

Command	Description
show atm ilmi-status, on page 58	Displays status information that is related to ILMI.

atm ilmi-keepalive

To enable Interim Local Management Interface (ILMI) keepalives on an ATM interface and configure keepalive polling frequency, use the **atm ilmi-keepalive** command in interface configuration mode. To disable ILMI keepalives, use the **no** form of this command.

atm ilmi-keepalive [**act-poll-freq** *frequency*] [**retries** *count*] [**inact-poll-freq** *frequency*]

no atm ilmi-keepalive [**act-poll-freq** *frequency*] [**retries** *count*] [**inact-poll-freq** *frequency*]

Syntax Description

act-poll-freq <i>frequency</i>	(Optional) Number of polling seconds between active keepalives. Range is from 1 through 65535 seconds. Default is 5 seconds.
retries <i>count</i>	(Optional) ILMI keepalive retry count. Range is from 2 through 5. Default is 4 retries.
inact-poll-freq <i>frequency</i>	(Optional) Number of polling seconds between inactive keepalives. Range is from 1 through 65535 seconds. Default is 1 second.

Command Default

act-poll-freq *frequency*: 5

retries *count*: 4

inact-poll-freq *frequency*: 1

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

The **atm ilmi-keepalive** command is effective only when an ILMI PVC is created under the physical ATM interface.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to enable ILMI keepalives for the ATM interface 0 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# atm ilmi-keepalive
```

The following example shows how to configure the ATM interface 1 in slot 6 to poll the number of inactive keepalives every 10 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1
RP/0/RP0/CPU0:router(config-if)# atm ilmi-keepalive inact-poll-freq 10
```

The following example shows how to disable ILMI keepalives for the ATM interface 0 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# no atm ilmi-keepalive
```

Related Commands

Command	Description
show atm ilmi-status , on page 58	Displays status information that is related to ILMI.

atm ilmi-trap disable

To disable Interim Local Management Interface (ILMI) trap generation on an ATM interface, use the **atm ilmi-trap disable** command in interface configuration mode. To reenable ILMI trap generation, use the **no** form of this command.

atm ilmi-trap disable

no atm ilmi-trap disable

Syntax Description This command has no keywords or arguments.

Command Default Support for ATM ILMI trap generation is enabled.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	Release 3.9.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	atm	read, write

Examples The following example shows how to disable ILMI trap generation on the ATM interface 0 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# atm ilmi-trap disable
```

The following example shows how to reenable ILMI trap generation on the ATM interface 0 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1
RP/0/RP0/CPU0:router(config-if)# no atm ilmi-trap disable
```

Related Commands

Command	Description
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.

atm maxvpi-bits 12

To enable support for the 12-bits virtual path identifier (VPI) Network-Node Interface (NNI) cell format, use the **atm maxvpi-bits 12** command in interface configuration mode. To disable support for the 12-bits VPI NNI cell format, use the **no** form of this command.

atm maxvpi-bits 12

no atm maxvpi-bits 12

Syntax Description

This command has no keywords or arguments.

Command Default

Support for the 12-bits VPI NNI cell format is disabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

Out of the twelve bits, four bits in the ATM UNI cell header are reserved for local standardized generic flow control (GFC).

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to enable support for the 12-bits VPI NNI cell format on the ATM interface 0 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# atm maxvpi-bits 12
```

The following example shows how to disable support for the 12-bits VPI NNI cell format on the ATM interface 1 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1
RP/0/RP0/CPU0:router(config-if)# no atm maxvpi-bits 12
```

Related Commands

Command	Description
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.

atm mcpt-timers

To define the three Maximum Cell Packing Timeout (MCPT) timers under a main ATM interface, use the **atm mcpt-timers** command in interface configuration mode. To return the three timers to the default configuration, use the **no** form of this command.

atm mcpt-timers *timer-1 timer-2 timer-3*

no atm mcpt-timers

Syntax Description

timer-1	Maximum number of microseconds to wait to complete cell packing on a single packet before that packet is transmitted. Range is from 50 through 4095. Note To associate this timer with an interface, use the cell-packing command and replace the <i>timer</i> argument 1 .
timer-2	Maximum number of microseconds to wait to complete cell packing on a single packet before that packet is transmitted. Range is from 50 through 4095. Note To associate this timer with an interface, use the cell-packing command and replace the <i>timer</i> argument 2 .
timer-3	Maximum number of microseconds to wait to complete cell packing on a single packet before that packet is transmitted. Range is from 50 through 4095. Note To associate this timer with an interface, use the cell-packing command and replace the <i>timer</i> argument 3 .

Command Default

timer-1 : 50
timer-2 : 50
timer-3 : 50

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **cell-packing** command to attach one of the three MCPT timers to an individual L2VPN port, PVC, or PVP. If the associated MCPT timer expires before the maximum number of cells that can be packed is reached, then the packet is transmitted with the number of cells that have been packed thus far.

**Note**

We recommend configuring a low, medium, and high value for the three MCPT timers to accommodate the different ATM traffic classes. Low-latency CBR traffic typically uses a low MCPT timer value, while high-latency UBR traffic typically requires a high MCPT timer value. VBR-rt and VBR-nrt traffic typically use a median MCPT timer value.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to configure the three MCPT timers and then apply one of them to an interface with the **cell-packing** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# atm mcpt-timers 50 100 200
RP/0/RP0/CPU0:router(config-if)# l2transport
RP/0/RP0/CPU0:router(config-if-l2)# cell-packing 6 1
```

Related Commands

Command	Description
cell-packing, on page 17	Configures the maximum number of cells allowed per packet, and specifies a MCPT timer for cell packing.
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.

atm oam flush

To drop all current and future Operation, Administration, and Maintenance (OAM) cells received on an ATM interface, use the **atm oam flush** command in interface configuration mode. To receive OAM cells on an ATM interface, use the **no** form of this command.

atm oam flush

no atm oam flush

Syntax Description This command has no keywords or arguments.

Command Default The dropping of OAM cells is disabled.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	Release 3.9.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	atm	read, write

Examples The following example shows how to enable the dropping of all current and future OAM cells received on the ATM interface 0 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# atm oam flush
```

The following example shows how to disable the dropping of all current and future OAM cells received on the ATM interface 1 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# no atm oam flush
```

Related Commands

Command	Description
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.
show atm class-link, on page 54	Displays configuration information for the parameters on a VC class that is associated with a particular PVC.
show atm vc-class, on page 82	Displays information about all ATM VC classes on the router or for a specific ATM VC-class.
show atm vp-tunnel	Displays VP tunnel information for the entire router or for a specific interface.

cell-packing

To configure the maximum number of cells allowed per packet, and specify a Maximum Cell Packing Timeout (MCPT) timer for cell packing, use the **cell-packing** command in the appropriate mode. To return the interface to the default cell packing configuration, use the **no** form of this command.

cell-packing *cells timer*

no cell-packing

Syntax Description

cells	Maximum number of cells to use per packet. Range is from 2 through 86.
timer	Indicates the appropriate MCPT timer to use for cell packing. Can be 1 , 2 , or 3 .
Note	You can configure up to three different MCPT values for a single main interface with the atm mcpt-timers command.

Command Default

If you do not configure the maximum number of cells allowed per packet, only one cell is carried per packet.

Command Modes

ATM layer 2 transport interface configuration (config-if-l2)

ATM layer 2 transport PVC configuration (config-atm-l2transport-pvc)

ATM layer 2 transport PVP configuration (config-atm-l2transport-pvp)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the [atm mcpt-timers, on page 13](#) command to configure the three MCPT timers under the main ATM interface.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to configure cell packing parameters on an ATM interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# l2transport
RP/0/RP0/CPU0:router(config-if-l2)# cell-packing 6 3
```

Related Commands

Command	Description
atm mcpt-timers, on page 13	Defines the three MCPT timers under a main ATM interface.
show atm cell-packing, on page 52	Displays cell packing information for the Layer 2 attachment circuits (ACs) configured on your system.
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.
show atm pvc, on page 68	Displays ATM PVC and traffic information for the entire router.
show atm pvp, on page 76	Displays ATM PVP and traffic information for the entire router, or a specific VPI or ATM interface.

class-int

To assign a virtual circuit (VC) class to an ATM main interface, use the **class-int** command in interface configuration mode. To remove a VC-class, use the **no** form of this command.

class-int *vc-class-name*

no class-int *vc-class-name*

Syntax Description

vc-class-name	Name of the VC-class you are assigning to your ATM main interface or subinterface.

Command Default

No VC-class is assigned to an ATM main interface or subinterface.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you create a VC-class for an ATM main interface or subinterface, you can use the **shape** and **encapsulation** commands to define your parameters.

Parameters that are applied to an individual VC supersede interface- and subinterface-level parameters. Parameters that are configured for a VC through discrete commands entered in interface-ATM-VC configuration mode supersede VC-class parameters assigned to an ATM main interface or subinterface by the **class-int** command.



Note

This command is not available for Layer 2 interfaces.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to create a class called “classA” and then apply that class to ATM main interface 1 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)#vc-class atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# shape cbr 40000
RP/0/RP0/CPU0:router(config-vc-class-atm)# encapsulation aal5snap
RP/0/RP0/CPU0:router(config-vc-class-atm)# oam-pvc manage 300
RP/0/RP0/CPU0:router(config-vc-class-atm)# commit
RP/0/RP0/CPU0:router(config-vc-class-atm)# exit
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1
RP/0/RP0/CPU0:router(config-if)# class-int classA
RP/0/RP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
show atm class-link, on page 54	Displays configuration information for the parameters on a VC class that is associated with a particular PVC.
show atm vc-class, on page 82	Displays information about all ATM VC classes on the router or for a specific ATM VC-class.

class-vc

To attach a virtual circuit (VC) class to an ATM permanent virtual circuit (PVC), use the **class-vc** command in ATM PVC configuration mode for a PVC that is configured on an ATM subinterface. To remove a VC-class from a PVC, use the **no** form of this command.

class-vc *vc-class-name*

no class-vc *vc-class-name*

Syntax Description

vc-class-name	Name of the VC-class you are assigning to your ATM PVC.

Command Default

No VC-class is assigned to an ATM PVC.

Command Modes

ATM PVC configuration (config-atm-vc)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you create a VC-class for an ATM subinterface PVC, you can use the **shape** and **encapsulation** commands to define your parameters.

Parameters that are applied to an individual VC supersede PVC-level parameters. Parameters that are configured for a VC through discrete commands entered in interface-ATM-VC configuration mode supersede VC-class parameters assigned to a PVC by the **class-vc** command.



Note

The **class-vc** command is available in ATM PVC configuration mode for a PVC that is configured on an ATM subinterface only. This command is not available in ATM PVC configuration mode for an ATM main interface.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to create a class called “classA” and then apply that class to the subinterface 1 on the ATM main interface 1 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# vc atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# shape cbr 40000
RP/0/RP0/CPU0:router(config-vc-class-atm)# commit
RP/0/RP0/CPU0:router(config-vc-class-atm)# exit
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1.1 point-to-point
RP/0/RP0/CPU0:router(config-if)# pvc 10/100
RP/0/RP0/CPU0:router(config-atm-vc)# class-vc classA
RP/0/RP0/CPU0:router(config-atm-vc)#
```

Related Commands

Command	Description
show atm class-link, on page 54	Displays configuration information for the parameters on a VC class that is associated with a particular PVC.
show atm vc-class, on page 82	Displays information about all ATM VC classes on the router or for a specific ATM VC-class.

encapsulation (ATM)

To configure the ATM adaptation layer (AAL) and encapsulation type for a virtual circuit (VC) class, ATM permanent virtual circuit (PVC), or ATM permanent virtual path (PVP), use the **encapsulation** command in the appropriate configuration mode. To remove an encapsulation type, use the **no** form of this command.

For point-to-point ATM PVCs and vc-classes:

encapsulation {aal5mux ipv4| aal5nlpid| aal5snap}

no encapsulation {aal5mux ipv4| aal5nlpid| aal5snap}

For ATM Layer 2 PVCs:

encapsulation {aal0| aal5}

no encapsulation {aal0| aal5}

Syntax Description

aal5mux ipv4	Specifies IPv4 encapsulation for multiplex (MUX)-type VCs. Note The aal5mux ipv4 keywords are available in ATM PVC configuration and ATM VC-class configuration modes only.
aal5nlpid	Specifies the AAL and encapsulation type that allows ATM interfaces to interoperate with High-Speed Serial Interfaces (HSSIs), which are using an ATM data service unit (ADSU) and running ATM-Data Exchange Interface (DXI). Supported on ATM PVCs only. Note The aal5nlpid keyword is available in ATM PVC configuration and ATM VC-class configuration modes only.
aal5snap	Specifies the AAL encapsulation type that supports Inverse ARP. Logical Link Control/Subnetwork Access Protocol (LLC/SNAP) precedes the protocol datagram. Note The aal5snap keyword is available in ATM PVC configuration and ATM VC-class configuration modes only.
aal0	Specifies the AAL encapsulation type that contains 48 bytes of data within an ATM cell. AAL0 cells are also referred to as “raw cells.” The payload consists of 48 bytes. Note The aal0 keyword is available in the ATM Layer 2 transport PVC configuration mode only.
aal5	Specifies the AAL encapsulation type that carries higher-layer datagrams while enhancing the link layer with services available through ATM. AAL5 is defined in the ITU standard I.363.5, and is typically used to carry IP datagrams over ATM. Note The aal5 keyword is available in the ATM Layer 2 transport PVC configuration mode only.

Command Default

For point-to-point PVCs, the default encapsulation type is **aal5snap**.

For Layer 2 PVCs, the default encapsulation type is **aal5**.

Command Modes

ATM PVC configuration (config-atm-vc)
 ATM VC-class configuration (config-vc-class-atm)
 ATM layer 2 transport PVC configuration (config-atm-l2transport-pvc)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **aal5mux ipv4** encapsulation option to dedicate the specified PVC to a single protocol; use the **aal5snap** encapsulation option to multiplex two or more protocols over the same PVC. Whether you select **aal5mux ipv4** or **aal5snap** encapsulation depends on the type of network you are configuring, and the pricing offered by that network. If the pricing of the network depends on the number of PVCs set up, we recommend **aal5snap** encapsulation. If pricing depends on the number of bytes transmitted, we recommend **aal5mux ipv4** encapsulation because it has less overhead than **aal5snap** and **aal5mux ipv4** encapsulation.

If you configure VC-class parameters for a PVC after that PVC is configured, you must enter the **shutdown** command followed by the **no shutdown** command on the ATM subinterface that hosts the PVC. This action restarts the interface, causing the newly configured VC-class parameters to take effect on that interface.

Unless specifically configured otherwise, a PVC automatically inherits the encapsulation type of the VC-class that is assigned to the main interface or subinterface that hosts the PVC. If no VC-class is assigned, then the PVC inherits the encapsulation type of the main interface or subinterface that hosts the PVC. If no encapsulation is configured of the main interface or subinterface, then the PVC inherits the default **aal5snap** encapsulation.

Use the **encapsulation** command in ATM PVC configuration mode to modify the inherited or default encapsulation assigned to a PVC. You can modify the encapsulation for each individual PVC to be different from the encapsulation configured for the VC-class that is assigned to the ATM main interface or subinterface that hosts the PVC.

If you do not use the **encapsulation** command to configure the encapsulation type for a new ATM PVC, then the PVC inherits the one of the following default configurations (listed in order of precedence from lowest to highest):

- The encapsulation assigned to the VC-class that is assigned to the PVC itself.
- The encapsulation assigned to the VC-class that is assigned to the ATM subinterface that hosts the PVC.
- The encapsulation assigned to the VC-class that is assigned to the ATM main interface that hosts the PVC
- The default **aal5snap** encapsulation

When configuring a PVC range or an individual PVC within a PVC range, the following encapsulation types are supported:

- **encapsulation aal5mux ipv4**

- **encapsulation aal5snap**

**Note**

For Layer 2 PVCs, the default encapsulation type is **aal5**, and the encapsulation type is not inherited from the VC-class.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to configure a VC-class with **aal5snap** encapsulation:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# vc atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# encapsulation aal5snap
```

The following example shows how to configure an individual PVC with **aal5mux** encapsulation:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 10/100
RP/0/RP0/CPU0:router(config-atm-vc)# encapsulation aal5mux
```

The following example shows how to remove **aal5mux ipv4** encapsulation from a VC-class:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# vc atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# no encapsulation aal5mux ipv4
```

The following example shows how to configure an individual Layer 2 PVC with **aal0** encapsulation:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1.10 l2transport
RP/0/RP0/CPU0:router(config-if)# pvc 30/300
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# encapsulation aal0
```

Related Commands

Command	Description
show atm pvc, on page 68	Displays ATM PVC and traffic information for the entire router.
show atm vc-class, on page 82	Displays information about all ATM VC classes on the router or for a specific ATM VC-class.

interface atm

To configure an ATM interface and enter ATM interface configuration mode, use the **interface atm** command in global configuration mode. To delete the interface configuration, use the **no** form of this command.

```
interface atm interface-path-id[. subinterface][point-to-point| l2transport]
no interface atm interface-path-id[. subinterface]
```

Syntax Description

<i>interface-path-id</i> . [<i>subinterface</i>]	Physical interface or virtual interface followed by the optional subinterface path ID. Naming notation is <i>interface-path-id.subinterface</i> . The period in front of the subinterface value is required as part of the notation. For more information about the syntax for the router, use the question mark (?) online help function.
point-to-point	Interface functions as one endpoint of a point-to-point link.
l2transport	Interface functions as one endpoint on an Layer 2 link.

Command Default

No interfaces are configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **interface** command enters interface configuration mode to allow you to configure interfaces. If a virtual interface is configured, then the interface is created if it did not already exist.

When you issue the **interface atm** command in global configuration mode, the CLI prompt changes to “config-if,” indicating that you have entered interface configuration submode for an ATM interface.



Note

Although the CLI prompt looks the same in the interface configuration mode for an ATM main interface and for an ATM subinterface, the commands that are available under each interface type vary.

In the following sample output, the question mark (?) online help function displays all the commands available under the interface configuration submode for a ATM main interface:

```
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0
RP/0/RP0/CPU0:router(config-if)#?

affinity      Affinity to include/exclude
atm           Global ATM interface configuration subcommands
bandwidth     Set the bandwidth of an interface
cdp           Enable CDP on an interface
class-int     Apply a VC class
commit        Commit the configuration changes to running
crypto        Set crypto parameters
dampening     configure state dampening on the given interface
describe      Describe a command without taking real actions
description   Set description for this interface
do            Run an exec command
exit          Exit from this submode
flow          Netflow configuration
frame-relay   Frame Relay interface configuration commands
ipv4          IPv4 interface subcommands
ipv6          IPv6 interface subcommands
l2transport   Enable Layer 2 transport and enter its configuration submode
load-interval Specify interval for load calculation for an interface
mpls          MPLS interface subcommands
mtu           Set the MTU on an interface
no            Negate a command or set its defaults
pvc           Configure a pvc on this interface
root          Exit to the global configuration mode
show          Show contents of configuration
--More--
```

In the following sample output, the question mark (?) online help function displays all the commands available under the interface configuration submode for a point-to-point ATM subinterface:

```
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-if)# ?

affinity      Affinity to include/exclude
bandwidth     Set the bandwidth of an interface
cdp           Enable CDP on an interface
class-int     Apply a VC class
commit        Commit the configuration changes to running
crypto        Set crypto parameters
dampening     configure state dampening on the given interface
describe      Describe a command without taking real actions
description   Set description for this interface
do            Run an exec command
exit          Exit from this submode
flow          Netflow configuration
frame-relay   Frame Relay interface configuration commands
ipv4          IPv4 interface subcommands
ipv6          IPv6 interface subcommands
load-interval Specify interval for load calculation for an interface
logging       Per-interface logging configuration
mpls          MPLS interface subcommands
mtu           Set the MTU on an interface
no            Negate a command or set its defaults
pvc           Configure a pvc on this interface
root          Exit to the global configuration mode
show          Show contents of configuration
shutdown      shutdown the given interface
--More--
```

In the following sample output, the question mark (?) online help function displays all the commands available under the interface configuration submode for an ATM Layer 2 subinterface:

```
RP/0/RP0/CPU0:router(config)#interface atm 0/2/0/0.1 l2transport
```

```
RP/0/RP0/CPU0:router(config-if)#?

bandwidth      Set the bandwidth of an interface
cdp            Enable CDP on an interface
commit         Commit the configuration changes to running
crypto         Set crypto parameters
dampening      Configure state dampening on the given interface
describe       Describe a command without taking real actions
description    Set description for this interface
do             Run an exec command
exit           Exit from this submode
firewall       Configure a Virtual Firewall on this Interface
flow          Netflow configuration
frame-relay    Frame Relay interface configuration commands
ipv4           IPv4 interface subcommands
ipv6           IPv6 interface subcommands
load-interval  Specify interval for load calculation for an interface
logging        Per-interface logging configuration
mpls           MPLS interface subcommands
mtu            Set the MTU on an interface
no             Negate a command or set its defaults
pvc            Configure a pvc on this interface
pvp            Configure a pvp on this interface
pwd           Commands used to reach current submode
root           Exit to the global configuration mode
show           Show contents of configuration
```

Cisco IOS XR software supports bulk removal of subinterfaces. To remove several subinterfaces with a single command enter, replace the *subinterface* argument with an asterisk (*), as shown in the following example:

```
RP/0/RP0/CPU0:router(config)# no interface atm 0/6/0/1.*
```



Note

Before you can perform a bulk removal of several subinterfaces, OAM F5 loopback cell generation must be enabled on the PVCs that are configured under the subinterfaces you want to remove. To enable OAM F5 loopback cell generation on a PVC, use the [oam-pvc manage, on page 34](#) command.



Note

The **I2transport** keyword is mutually exclusive with any Layer 3 interface configuration.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter interface configuration mode for the ATM main interface 1 in slot 6:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1
RP/0/RP0/CPU0:router(config-if)#
```

The following example shows how to enter ATM interface configuration mode for a point-to-point subinterface. In this example, the user adds a subinterface to the ATM main interface 0 in slot 2:

```
RP/0/RP0/CPU0:router# configure
```



```
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-if)#
```

The following example shows how to enter ATM interface configuration mode for a Layer 2 subinterface. In this example, the user adds a subinterface to the ATM main interface 0 in slot 2:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 l2transport
RP/0/RP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
show atm interface atm , on page 61	Displays ATM-specific information about an ATM interface.

I2transport (ATM)

To enable Layer 2 transport port mode on an ATM interface and enter Layer 2 transport configuration mode, use the **I2transport** command in interface configuration mode. To disable Layer 2 transport port mode on an ATM interface, use the **no** form of this command.

I2transport

no I2transport

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Interface configuration (config-if)

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you issue the **I2transport** command in interface configuration mode, the CLI prompt changes to “config-if-l2,” indicating that you have entered the Layer 2 transport configuration submode. In the following sample output, the question mark (?) online help function displays all the commands available under Layer 2 transport configuration submode for an ATM interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0
RP/0/RP0/CPU0:router(config-if)# I2transport
RP/0/RP0/CPU0:router(config-if-l2)# ?

cell-packing    Configure L2VPN cell packing parameters
commit          Commit the configuration changes to running
describe        Describe a command without taking real actions
do              Run an exec command
exit            Exit from this submode
no              Negate a command or set its defaults
pwd             Commands used to reach current submode
root            Exit to the global configuration mode
service-policy  Configure QoS Service policy
show            Show contents of configuration

RP/0/RP0/CPU0:router(config-if-l2)#
```

**Note**

The **l2transport** command is mutually exclusive with any Layer 3 interface configuration.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to enable Layer 2 transport port mode on an ATM interface and enter Layer 2 transport configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface ATM 0/2/0/0
RP/0/RP0/CPU0:router(config-if)# l2transport
RP/0/RP0/CPU0:router(config-if-l2)#
```

Related Commands

Command	Description
show l2vpn xconnect	Displays brief information on configured xconnects.

oam ais-rdi

To configure the behavior of an ATM permanent virtual circuit (PVC) when it receives Operation, Administration, and Maintenance (OAM) alarm indication signal and remote defect indication (AIS/RDI) cells, use the **oam ais-rdi** command in ATM PVC configuration or ATM VC-class configuration mode. To return the PVC to the default behavior, use the **no** form of this command.

oam ais-rdi [*down-count* [*up-count*]]

no oam ais-rdi [*down-count* [*up-count*]]

Syntax Description

down-count	(Optional) Number of consecutive OAM AIS/RDI cells received on a PVC before that PVC is brought down. Range is from 1 through 60. The default is 1.
up-count	(Optional) Number of seconds after which a down PVC is brought up if no OAM AIS/RDI cells are received. Range is from 3 through 60. The default is 3. The specified <i>up-count</i> applies under the following conditions only: • OAM F5 loopback cell generation must be enabled on the PVC. • The PVC is in a down state because it received AIS/RDI cells. Note To enable OAM F5 loopback cell generation on a PVC, use the oam-pvc manage, on page 34 command.

Command Default

down-count: 1
up-count: 3

Command Modes

ATM VC-class configuration (config-vc-class-atm)
ATM PVC configuration (config-atm-vc)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **oam ais-rdi** command to configure the following:

- the maximum number of Operation, Administration, and Maintenance (OAM) alarm indication signals and remote defect indication (AIS/RDI) cells that can be received on a PVC before it is brought down.

- the interval after which a downed PVC comes back up if no OAM AIS/RDI cells have been received.

Use the **oam ais-rdi** command in ATM PVC configuration mode to configure the OAM AIS/RDI down count and up count for a specific PVC.

Use the **oam ais-rdi** command in ATM VC-class configuration mode to configure the OAM AIS/RDI down count and up count for all PVCs that are associated with the specified class map.

Keep the following in mind when configuring the OAM AIS/RDI down count and up count:

- Unless specifically configured otherwise, a PVC automatically inherits the OAM AIS/RDI down count and up count of the VC-class that is assigned to the main interface or subinterface that hosts the PVC.
- If the OAM AIS/RDI down count and up count is not configured for the VC-class, or if no VC-class is assigned to the main interface or subinterface that hosts the PVC, or to the PVC itself, then the PVC inherits the default OAM AIS/RDI down count and up count.

The default values for the OAM AIS/RDI down count and up count are used in the following situations:

- If the **oam ais-rdi** command has not been entered
- If the **oam ais-rdi** command is entered without the *up-count* or *down-count* argument
- If the **no oam ais-rdi** command is entered

If the **oam ais-rdi** command is entered without the *up-count* or *down-count* argument, the command does not appear in the **show running-config** command output.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to bring down a PVC after 25 consecutive OAM AIS/RDI cells have been received on the PVC. The PVC is brought up when no OAM AIS/RDI cells have been received for 5 seconds.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 50/100
RP/0/RP0/CPU0:router(config-atm-vc)# oam ais-rdi 25 5
```

The following example shows how to configure the OAM AIS/RDI down count and up count for a VC-class. In this example, all PVCs that are associated with the VC-class called “classA” inherit an OAM AIS/RDI down count of 30 and up count of 10:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# vc atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# oam ais-rdi 30 10
```

Related Commands

Command	Description
show atm class-link , on page 54	Displays configuration information for the parameters on a VC class that is associated with a particular PVC.
show atm pvc , on page 68	Displays ATM PVC and traffic information for the entire router.

oam-pvc manage

To enable ATM Operation, Administration, and Maintenance (OAM) F5 loopback cell generation and configure continuity check (CC) management for an ATM permanent virtual circuit (PVC), use the **oam-pvc manage** command in ATM PVC configuration or ATM VC-class configuration mode. To disable OAM F5 continuity checking on a PVC, use the **no** form of this command.

In ATM PVC configuration mode:

oam-pvc manage [*f* frequency] [disable] [keep-vc-up [seg-aisrdi-failure]]

no oam-pvc manage [frequency] [disable] [keep-vc-up [seg-aisrdi-failure]]

In ATM VC class configuration mode:

oam-pvc manage [frequency]

no oam-pvc manage [frequency]

Syntax Description

frequency	(Optional) Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted. Range is from 0 through 600.
disable	(Optional) Disables OAM management on the specified PVC. Note The disable keyword is available in ATM PVC configuration mode only.
keep-vc-up	(Optional) Specifies that PVC remains in the UP state when CC cells detect connectivity failure. Note The keep-vc-up keyword is available in ATM PVC configuration mode only.
seg-aisrdi-failure	(Optional) Specifies that if segment AIS/RDI cells are received, the VC will not be brought down because of end CC failure or loopback failure. Note The seg-aisrdi-failure keyword is available in ATM PVC configuration mode only.

Command Default

frequency: 10 seconds

Command Modes

ATM PVC configuration (config-atm-vc)

ATM VC class configuration (config-vc-class-atm)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Keep the following in mind when configuring the OAM F5 loopback cell generation and CC management for an ATM PVC:

- Unless specifically configured otherwise, a PVC automatically inherits the OAM F5 loopback cell management configuration from the VC-class that is assigned to the main interface or subinterface that hosts the PVC.
- If OAM F5 loopback cell generation is not enabled for the assigned VC-class, or if no VC-class is assigned to the PVC itself, or to main interface or subinterface that hosts the PVC, then OAM F5 loopback cell generation is disabled on that PVC. To enable OAM F5 loopback cell generation on that PVC, you need to use the **oam-pvc manage** command in ATM PVC configuration mode.
- VC-classes support the configuration of the *seconds* argument only; the **keep-vc-up**, **disable**, and **seg-aisr-di-failure** keywords are available in ATM PVC configuration mode only and are configured directly on each individual PVC.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to enable OAMF5 loopback cell generation on a PVC, and configure the PVC to remain up when CC cells detect connectivity failure:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 10/100
RP/0/RP0/CPU0:router(config-atm-vc)# oam-pvc manage 200 keep-vc-up
```

The following example shows how to disable OAMF5 loopback cell generation on a PVC:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 10/100
RP/0/RP0/CPU0:router(config-atm-vc)# oam-pvc manage disable
```

The following example shows how to configure the OAM F5 loopback frequency for a VC-class. In this example, all PVCs associated with the VC-class called “classA” transmit end-to-end F5 OAM loopback cells every 300 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# vc atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# oam-pvc manage 300
```

The following example shows how to remove the configured ATM OAM F5 loopback frequency from a VC-class:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# vc atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# no oam-pvc manage
```

Related Commands

Command	Description
show atm class-link, on page 54	Displays configuration information for the parameters on a VC class that is associated with a particular PVC.
show atm pvc, on page 68	Displays ATM PVC and traffic information for the entire router.

oam retry

To configure the number of F5 Operation, Administration, and Maintenance (OAM) loopback cells that need to be successfully transmitted by a down ATM permanent virtual circuit (PVC) before it is brought up, use the **oam retry** command in ATM PVC configuration or ATM VC-class configuration mode. To return the PVC to the default behavior, use the **no** form of this command

oam retry [*up-count* [*down-count* [*retry-frequency*]]]

no oam retry [*up-count* [*down-count* [*retry-frequency*]]]

Syntax Description

retry-count	(Optional) Number of consecutive end-to-end F5 OAM loopback cell responses that must be received to change a connection state to up.
down-count	(Optional) Number of consecutive unreceived end-to-end F5 OAM loopback cells allowed on a PVC before its state changes to down.
retry-frequency	(Optional) Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the up or down state is being verified. For example, if a PVC is up and a loopback cell response is not received after the frequency (in seconds) is specified using the oam-pvc manage command, loopback cells are sent at the retry frequency to verify whether the PVC is down.

Command Default

up-count: 3

down-count: 5

retry-frequency: 1 second

Command Modes

ATM PVC configuration (config-atm-vc)

ATM VC-class configuration (config-vc-class-atm)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Keep the following in mind when configuring the OAM AIS/RDI down count and up count:

- Unless specifically configured otherwise, a PVC automatically inherits the OAM AIS/RDI down count and up count of the VC-class that is assigned to the main interface or subinterface that hosts the PVC.

- If no encapsulation is configured for the VC-class, or if no VC-class is assigned to the main interface or subinterface that hosts the PVC, or to the PVC itself, then the PVC inherits the default OAM AIS/RDI down count and up count.

Keep the following in mind when configuring the F5 OAM loopback cell up count, down count, and retry frequency:

- Unless specifically configured otherwise, a PVC automatically inherits the F5 OAM loopback cell up count, down count, and retry frequency of the VC-class that is assigned to the main interface or subinterface that hosts the PVC.
- If the F5 OAM loopback cell up count, down count, and retry frequency are not configured for the VC-class, or if no VC-class is assigned to the PVC itself, or to the main interface or subinterface that hosts the PVC, then the PVC inherits the default F5 OAM loopback cell up count, down count, and retry frequency.

In other words, if the **oam retry** command is not explicitly configured on an individual PVC, then that PVC inherits the following default configuration (listed in order of precedence):

- F5 OAM loopback cell up count, down count, and retry frequency configured for the VC-class that is assigned to the PVC itself
- F5 OAM loopback cell up count, down count, and retry frequency configured for VC-class assigned to the ATM subinterface that hosts the PVC
- F5 OAM loopback cell up count, down count, and retry frequency configured for the VC-class assigned to the ATM main interface that hosts the PVC



Note

For the defaults, it is assumed that OAM loopback cell generation is enabled on the PCV. To enable OAM F5 loopback cell generation, use the **oam-pvc manage** command.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to OAM management parameters for an ATM PVC. In this example, the PVC is brought down after five consecutive OAM AIS/RDI cells are received and then brought back up when no OAM AIS/RDI cells are received for 10 seconds. End-to-end F5 OAM loopback cells are transmitted every five seconds if a change in the up or down state is verified.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 10/100
RP/0/RP0/CPU0:router(config-atm-vc)# oam retry 5 10 5
```

The following example shows how to configure OAM management parameters for a VC-class. In this example, all PVCs that are associated with the VC-class called “classA” inherit an OAM up-count of 3, down-count of 5, and retry-frequency of 10:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# vc atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# oam retry 10 20 10
```

Related Commands

Command	Description
show atm class-link, on page 54	Displays configuration information for the parameters on a VC class that is associated with a particular PVC.
show atm pvc, on page 68	Displays ATM PVC and traffic information for the entire router.

ping atm interface atm

To verify connectivity between two ATM connection endpoints through a permanent virtual circuit (PVC) or VP-tunnel, use the **ping atm interface atm** command in EXEC mode.

ping atm interface atm *interface-path-id* [*. subinterface*] [*vpi/vci*] [**end-loopback** *packets*| **seg-loopback** *packets*] [**timeout** *seconds*]

Syntax Description

<i>interface-path-id</i> [<i>.subinterface</i>]	Physical interface or virtual interface followed by the optional subinterface path ID. Naming notation is <i>interface-path-id.subinterface</i> . The period in front of the subinterface value is required as part of the notation. For more information about the syntax for the router, use the question mark (?) online help function.
<i>vpi/vci</i>	(Optional) ATM virtual path identifier (VPI) and virtual channel identifier (VCI) numbers. The absence of the slash (/) and a <i>vpi</i> value defaults the <i>vpi</i> value to 0. Note A VPI of 0 is not applicable to VP-tunnels or Layer 2 PVPs.
end-loopback <i>packets</i>	(Optional) Sends a specified number of end-to-end OAM loopback packets over the connection. Replace <i>packets</i> with the number of end-to-end OAM loopback packets you want to send over the ATM interface.
seg-loopback <i>packets</i>	(Optional) Sends a specified number of segmented OAM loopback packets over the connection. Replace <i>packets</i> with the number of OAM loopback packets you want to send over the ATM interface.
timeout <i>seconds</i>	Predetermined time during which the destination can send an OAM loopback response cell back to the source. Replace <i>seconds</i> with number of seconds to wait for an OAM loopback response before the ping times out. The default value of the timeout is 2 seconds on Cisco routers.

Command Default

seconds: 2

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The following guidelines apply to PVCs and VC-classes.

The **ping atm interface atm** command sends an OAM packet to verify ATM PVC connectivity. The status of the PVC is displayed when a response to the OAM packet is received. This is a common method for testing the accessibility of the devices.

The **ping atm interface atm** command is used to determine the following:

- Whether a remote host is active or inactive.
- The round-trip delay in communicating with the host.
- Packet loss.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Include the **end-loopback packets** keyword argument with the **ping atm interface atm** command to verify end-to-end PVC integrity.

Include the **seg-loopback packets** keyword argument with the **ping atm interface atm** command to verify PVC integrity to the immediate neighboring ATM device.

**Note**

The **ping** command is not available for Layer 2 ACs.

Task ID

Task ID	Operations
basic-services	execute
atm	read

Examples

The following example shows how verify connectivity between two ATM connection endpoints through a PVC with a VPI of 10 and a VCI of 100.

```
RP/0/RP0/CPU0:router# ping atm interface atm 0/2/0/0.10 10/100
```

Related Commands

Command	Description
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.

pvc (ATM)

To create an ATM permanent virtual circuit (PVC) with Interim Local Management Interface (ILMI) encapsulation and enter ATM virtual circuit configuration mode, use the **pvc** command in interface configuration mode or subinterface configuration mode. To remove an ATM PVC from an interface, use the **no** form of this command.

In interface configuration mode for a point-to-point ATM main interface:

pvc *vpi/vci* **ilmi**

no pvc *vpi/vci* **ilmi**

In interface configuration mode for an ATM subinterface:

pvc *vpi/vci*

no pvc *vpi/vci*

Syntax Description

vpi/	ATM network virtual path identifier (VPI) for this PVC. If support for the 12-bits VPI Network-Node Interface (NNI) cell format is enabled on the ATM main interface that hosts this PVC, then the range is from 0 through 4095. If support for the 12-bits VPI NNI cell format is not enabled on the host ATM main interface, then the range is from 0 through 255. Note To enable support for the 12-bits VPI NNI cell format on the main ATM interface hosting the specified PVC, use the atm maxvpi-bits 12 command.
vci	ATM network virtual channel identifier (VCI) for this PVC. Range is from 1 through 65535. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has local significance only. Note Typically, lower values from 1 through 18 are reserved for specific traffic (for example, F4 OAM, ILMI, and so on), and should not be used. Note The <i>vpi</i> and <i>vci</i> arguments cannot both be set to 0; if one is 0, the other cannot be 0.
ilmi	Sets up communication with the Interim Local Management Interface (ILMI). The associated VPI is 0, and VCI the associated VCI is any VCI. Note VCI 16 is typically used for ILMI. Note The ilmi keyword is available for point-to-point ATM interfaces only.

Command Default

No PVC is defined.

Command Modes

Interface configuration (config-if)

Subinterface configuration (config-subif)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **pvc** command creates a PVC and attaches it to the specified VPI and VCI. Both the *vpi* and *vci* arguments cannot be simultaneously specified as 0; if one is 0, the other cannot be 0.

Cisco IOS XR software dynamically creates rate queues as necessary to satisfy the requests of the PVC commands.

When you issue the **pvc** command in interface or subinterface configuration mode for a point-to-point ATM main interface, the CLI prompt changes to “config-atm-vc,” indicating that you have entered the ATM virtual circuit configuration submode.



Note

Although the CLI prompt looks the same for the ATM virtual circuit configuration submode under the ATM main interface and the ATM subinterface in point-to-point configurations, the commands that are available under each interface type vary.

When you issue the **pvc** command in subinterface configuration mode for an ATM AC, the CLI prompt changes to “config-atm-l2transport-pvc,” indicating that you have entered the ATM layer 2 transport PVC configuration submode.



Note

For the 4-Port OC-3 and 4-Port OC-12 line cards, the VCI range is 19 through 65535.

In the following sample output, the question mark (?) online help function displays all the commands available under the ATM virtual circuit configuration submode for the main ATM interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-if)# pvc 10/100
RP/0/RP0/CPU0:router(config-atm-vc ?

  commit      Commit the configuration changes to running
  describe    Describe a command without taking real actions
  do          Run an exec command
  exit        Exit from this submode
  no          Negate a command or set its defaults
  root        Exit to the global configuration mode
```

```
RP/0/0/CPU0:router(config-atm-vc)#
```

In the following sample output, the question mark (?) online help function displays all the commands available under the ATM virtual circuit configuration submode for the ATM subinterface:

```
RP/0/RP0/CPU0:router# configure
```



```
RP/0/RP0/CPU0:router(config-if)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 20/200
RP/0/RP0/CPU0:router(config-atm-vc)# ?
```

```
class-vc      Configure vc-class
commit        Commit the configuration changes to running
describe      Describe a command without taking real actions
do            Run an exec command
encapsulation Configure encapsulation on this PVC
exit          Exit from this submode
no            Negate a command or set its defaults
oam           Configure ATM OAM VC commands
oam-pvc       Enter OAM to generate OAM cells
root          Exit to the global configuration mode
service-policy Configure QoS Service policy
shape         ATM Traffic Shaping
show          Show contents of configuration
```

```
RP/0/RP0/CPU0:router(config-atm-vc)#
```

In the following sample output, the question mark (?) online help function displays all the commands available under the ATM layer 2 transport PVC configuration submode for the ATM interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config-if)# interface atm 0/2/0/0.1 l2transport
RP/0/RP0/CPU0:router(config-subif)# pvc 20/200
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)# ?
```

```
cell-packing  Configure L2VPN cell packing parameters
class-vc      Configure vc-class
commit        Commit the configuration changes to running
describe      Describe a command without taking real actions
do            Run an exec command
encapsulation Configure encapsulation on this PVC
exit          Exit from this submode
no            Negate a command or set its defaults
oam           Configure ATM OAM VC commands
oam-ac        Configure L2VPN OAM parameters
oam-pvc       Enter OAM to generate OAM cells
pwd           Commands used to reach current submode
root          Exit to the global configuration mode
service-policy Configure QoS Service policy
shape         ATM Traffic Shaping
show          Show contents of configuration
```

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to create an ATM PVC with ILMI encapsulation on an ATM main interface, and enter ATM virtual circuit configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/1
RP/0/RP0/CPU0:router(config-if)# pvc 5/100 ilmi
RP/0/RP0/CPU0:router(config-atm-vc)#
```

The following example shows how to create an ATM PVC on a point-to-point ATM subinterface and enter ATM virtual circuit configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config-if)# interface atm 0/2/0/0.1 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 20/200
RP/0/RP0/CPU0:router(config-atm-vc)#
```

The following example shows how to create an ATM PVC on an ATM layer 2 subinterface and enter ATM layer 2 transport PVC configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config-if)# interface atm 0/2/0/0.1 l2transport
RP/0/RP0/CPU0:router(config-subif)# pvc 20/200
RP/0/RP0/CPU0:router(config-atm-l2transport-pvc)#
```

Related Commands

Command	Description
show atm class-link, on page 54	Displays configuration information for the parameters on a VC class that is associated with a particular PVC.
show atm pvc, on page 68	Displays ATM PVC and traffic information for the entire router.

pvp (ATM)

To create an ATM permanent virtual path (PVP) and enter ATM layer 2 transport PVP configuration mode, use the **pvp** command in subinterface configuration mode. To remove an ATM PVP from an interface, use the **no** form of this command.

pvp *vpi*

no pvp *vpi*

Syntax Description

<i>vpi</i>	ATM network virtual path identifier (VPI) for this PVC. If support for the 12-bit VPI Network-Node Interface (NNI) cell format is enabled on the ATM main interface that hosts this PVP, then the range is from 1 through 4095. If support for the 12-bit VPI NNI cell format is not enabled on the host ATM main interface, then the range is from 1 through 255. Note To enable support for the 12-bits VPI NNI cell format on the main ATM interface hosting the specified PVP, use the atm maxvpi-bits 12 command.

Command Default

No PVC is defined.

Command Modes

Subinterface configuration (config-subif)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **pvp** command creates a PVP and attaches it to the specified VPI.

Cisco IOS XR software dynamically creates rate queues as necessary to satisfy the requests of the PVP commands.

When you issue the **pvp** command in subinterface configuration mode, the CLI prompt changes to “config-atm-l2transport-pvp,” indicating that you have entered the ATM layer 2 transport PVP configuration submode.



Note

The **pvp** command is available for layer 2 subinterfaces only.

**Note**

PVPs do not support a VPI of 0.

In the following sample output, the question mark (?) online help function displays all the commands available under the ATM layer 2 transport PVP configuration submode for the ATM subinterface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config-if)# interface atm 0/2/0/0.1 l2transport
RP/0/RP0/CPU0:router(config-subif)# pvp 20
RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)# ?

cell-packing    Configure L2VPN cell packing parameters
commit          Commit the configuration changes to running
describe        Describe a command without taking real actions
do              Run an exec command
exit            Exit from this submode
no              Negate a command or set its defaults
pwd             Commands used to reach current submode
root            Exit to the global configuration mode
shape           ATM Traffic Shaping
show            Show contents of configuration
```

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to create an ATM PVP on an ATM subinterface, and enter ATM layer 2 transport PVP configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config-if)# interface atm 0/2/0/0.1 l2transport
RP/0/RP0/CPU0:router(config-subif)# pvp 20
RP/0/RP0/CPU0:router(config-atm-l2transport-pvp)#
```

Related Commands

Command	Description
show atm pvp , on page 76	Displays ATM PVP and traffic information for the entire router, or a specific VPI or ATM interface.

shape

To configure ATM traffic shaping for a PVC, use the **shape** command in the appropriate command mode. To remove the configured ATM traffic shaping and return the PVC to using the default constant bit rate (CBR) traffic shaping, use the **no** form of this command.

```
shape {cbr peak_output_rate| ubr peak_output_rate| vbr-nrt peak_output_rate sustained_output_rate
burst_size| vbr-rt peak_output_rate sustained_output_rate burst_size}
```

```
no shape
```

Syntax Description

cbr	Configures the service class for the VC or VP-tunnel to be CBR. Range is from 38 through 622000 kbps. This is the default service class.
ubr	Configures the service class for the VC or VP-tunnel to be unspecified bit rate (UBR). UBR is intended for non-real-time applications that do not require any maximum bound on the transfer delay or on the cell loss ratio. Ranges follow: • OC12—from 38 through 622000 • OC3—from 38 through 155000
vbr-nrt	Configures the service class for the VC or VP-tunnel to be variable Bit Rate-Non Real Time (VBR-nrt).
vbr-rt	Configures the service class for the VC or VP-tunnel to be variable bit rate-real time (VBR-rt).
<i>peak_output_rate</i>	Peak output rate for the bit rate. Replace the <i>peak_output_rate</i> argument with the peak output rate in kbps. For VP-tunnels, the ranges follow: • OC12—84 through 622000 • OC3—84 through 155000 For VCs, the ranges follow: • OC12—38 through 622000 • OC3—38 through 155000 Note The <i>peak_output_rate</i> must be to be greater than <i>sustained_output_rate</i> .

sustained_output_rate Sustained output rate for the bit rate. Replace the *sustained_output_rate* argument with the sustained output rate in kbps.

For VP-tunnels, the ranges follow:

- OC12—84 through 622000
- OC3—84 through 155000

For VCs, the ranges follow:

- OC12—38 through 622000
- OC3—38 through 155000

Note The *sustained_output_rate* must be to be less than *peak_output_rate*.

burst_size Burst cell size for the bit rate. Replace the *sustained_output_rate* argument with the burst size. Range is from 1 through 8192.

Command Default

The default service class for the VC is **cbr**.

Command Modes

ATM PVC configuration (config-atm-vc)
 ATM VC-class configuration (config-vc-class-atm)
 ATM Layer 2 transport PVC configuration (config-atm-l2transport-pvc)
 ATM Layer 2 transport PVP configuration (config-atm-l2transport-pvp)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to configure the service class for a PVC to be UBR, with a peak output of 150,000 kbps:

```
RP/0/RP0/CPU0:router#config
RP/0/RP0/CPU0:router(config)# interface atm 0/6/0/0.2 point-to-point
RP/0/RP0/CPU0:router(config-subif)# pvc 20/200
RP/0/RP0/CPU0:router(config-atm-vc)# shape ubr 150000
```

The following example shows how to configure the service class for a VC to be VBR-nrt:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# vc-class atm class1
RP/0/RP0/CPU0:router(config-vc-class-atm)# shape vbr-nrt 100000 100000 8000
RP/0/RP0/CPU0:router(config-vc-class-atm)# exit
RP/0/RP0/CPU0:router(config)# exit
Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:y
RP/0/RP0/CPU0:router#
```

Related Commands

Command	Description
show atm pvc , on page 68	Displays ATM PVC and traffic information for the entire router.
show atm pvp , on page 76	Displays ATM PVP and traffic information for the entire router, or a specific VPI or ATM interface.
show atm vp-tunnel	Displays VP tunnel information for the entire router or for a specific interface.

show atm cell-packing

To display cell packing information for the Layer 2 attachment circuits (ACs) configured on your system, use the **show atm cell-packing** command in EXEC mode.

show atm cell-packing

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes EXEC (#)

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Operations
atm	read

Examples The following sample output is from the **show atm cell-packing** command:

```
RP/0/RP0/CPU0:router# show atm cell-packing
```

Circuit Type		local MNCP	avg # cells/pkt rcvd	negotiated MNCP	avg # cells/pkt sent	MCPT (us)
ATM0/2/0/1.200	vc 1/200	1	0	1	0	50
ATM0/2/0/1.300	vc 1/300	1	0	1	0	50

Table 1: show atm cell-packing Field Descriptions

Field	Description
Circuit Type	AC instance and virtual channel identifier. • The AC instance is expressed in the <i>rack/slot/module/port.subinterface</i> format. • The virtual channel identifier is expressed in the <i>subinterface/vci</i> format.
Local MNCP	Maximum number of cells that can be packed on the local AC.
AVG cells/pkt rcvd	Average number of cells in a packed cell received from the peer, or the average number of cells packed by the peer.
negotiated MNCP	Negotiated maximum number of cells that can be packed on a psuedowire between PE routers.
AVG cells/pkt sent	Maximum number of cells that can be packed on the peer AC.
MCPT	Maximum number of cells allowed per packet configured on the local MCPT.

show atm class-link

To display configuration information for the parameters on a virtual circuit (VC) class that is associated with a particular PVC, use the **show atm class-link** command in privileged EXEC mode.

show atm class-link *vpi/vci*

Syntax Description	<i>vpi/vci</i> ATM VPI and VCI numbers. The absence of the slash (/) and a <i>vpi</i> value defaults the <i>vpi</i> value to 0. Note A VPI of 0 is not applicable to VP-tunnels.

Command Default	The absence of the slash (/) and a <i>vpi</i> value defaults the <i>vpi</i> value to 0.

Command Modes	EXEC (#)

Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>Release 3.9.2</td><td>This command was introduced.</td></tr> </table>	Release	Modification	Release 3.9.2	This command was introduced.
Release	Modification				
Release 3.9.2	This command was introduced.				

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

	
Note	If a PVC or its host interface is associated with a VC-class, then that PVC inherits all the values configured for that VC-class. If no VC-class is configured for a PVC or its host interface, then the command output displays a message that says “VC class not supported on this VC.”

Task ID	<table> <tr> <th>Task ID</th><th>Operations</th></tr> <tr> <td>atm</td><td>read</td></tr> </table>	Task ID	Operations	atm	read
Task ID	Operations				
atm	read				

Examples	The following sample output is from the show atm class-link command:

RP/0/RP0/CPU0:router# **show atm class-link** 10/100

```

ATM0/2/0/0.1: VPI: 10 VCI: 100
shape : cbr 100000 (VC-class configured on VC)
encapsulation : aal5snap (VC-class configured on VC)
oam-pvc : manage 300 (VC-class configured on VC)
oam retry : 3 5 1 (Default value)
oam ais-rdi : 1 3 (Default value)

```

Table 2: show atm class-link Field Descriptions, on page 55 describes the significant fields shown in the display.

Table 2: show atm class-link Field Descriptions

Field	Description
ATM <i>rack/slot/module/port</i>	Interface instance, expressed in the <i>rack/slot/module/port</i> format.
VPI	Virtual path identifier.
VCI	Virtual channel identifier.
shape	Service class for the VC or VP-tunnel and the peak output rate for the bit rate. Possible service classes follow: • cbr • ubr • vbr-nrt • vbr-rt
encapsulation	Encapsulation type for this VC.
oam-pvc	Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted on this PVC. Range is from 0 through 600. Note Use the oam-pvc manage command to modify the current configuration for this field.

Field	Description
oam retry	Displays the following F5 OAM loopback cell retry count, down count, and retry frequency that has been configured on the VC-class that is associated with the specified PVC: • Number of consecutive end-to-end F5 OAM loopback cell responses that must be received to change a connection state to up. (Retry count) • Number of consecutive unreceived end-to-end F5 OAM loopback cells allowed on a PVC before its state changes to down. (down count) • Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the up or down state is being verified. (retry frequency) Note Use the oam retry command to modify the current configuration for this field. Note If the F5 OAM loopback cell retry count, down count, or retry frequency was not configured on the VC-class map that is associated with the specified PVC, then the command output does not display information for the oam retry field.
oam ais-rdi	Displays the following OAM AIS/RDI-related information for the PVC: • the maximum number of OAM AIS/RDI cells that can be received on a PVC before it is brought down. • the interval after which a downed PVC comes back up if no OAM AIS/RDI cells have been received. Note Use the oam ais-rdi command in to modify the current configuration for this field.

The following sample output is from the **show atm class-link** command when there is no VC-class associated with the specified PVC:

```
RP/0/RP0/CPU0:router# show atm class-link 0/50

Detailed display of VC(s) with VPI/VCI = 0/50

Class link for VC 0/50
ATM0/2/0/2: VPI: 0 VCI: 50
ILMI VC (VC class not supported on this VC)
```

Related Commands

Command	Description
class-int , on page 19	Assigns a VC class to an ATM main interface.
vc-class atm , on page 93	Creates a VC class for an ATM PVC or an ATM interface and enters VC-class configuration mode.

show atm ilmi-status

To display status information that is related to Interim Local Management Interface (ILMI), use the **show atm ilmi-status** command in EXEC mode.

```
show atm ilmi-status[atm interface-path-id[ .subinterface ]]
```

Syntax Description

atm	(Optional) ATM interface for which you want to display information. Use the <i>interface-path-id</i> argument to specify the ATM interface.
interface-path-id[.subinterface]	Physical interface or virtual interface followed by the optional subinterface path ID. Naming notation is <i>interface-path-id.subinterface</i> . The period in front of the subinterface value is required as part of the notation. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

Entering the **show atm ilmi-status** command without specifying an interface displays ILMI-related status information for all ATM interfaces.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
atm	read

Examples

The following sample output is from the **show atm ilmi-status** command:

```
RP/0/RP0/CPU0:router# show atm ilmi-status
Interface : ATM0/2/0/1 Interface Type : Private UNI (User-side)
```

```

ILMI VCC : (20, 30)
ILMI Keepalive : Disabled
ILMI State:      WaitDevType
Peer IP Addr : 0.0.0.0      Peer IF Name : ATM1/2
Active Prefix(s) :

```

The following sample output is from the **show atm ilmi-status** command with the **atm instance** keyword and argument:

```

RP/0/RP0/CPU0:router# show atm ilmi-status atm 0/2/0/2

Interface : ATM0/2/0/2 Interface Type : Private UNI (User-side)
ILMI VCC : (0, 16) ILMI Keepalive : Disabled
ILMI State:      UpAndNormal
Peer IP Addr:    0.0.0.0      Peer IF Name:      ATM1/2
Active Prefix(s) :

```

Table 3: show atm ilmi-status Field Descriptions

Field	Description
Interface	Interface type and instance. The instance is displayed in the <i>rack/slot/module/port</i> format.
Interface Type	ATM interface type (Private or Public), and the communication protocol used by this interface. Note Currently, Cisco IOS XR software supports UNI only.
ILMI VCC	The virtual channel connection associated with this interface.
ILMI Keepalive	ILMI keepalives polling frequency configured on this interface. To modify the ILMI keepalives polling frequency, use the atm ilmi-keepalive command.

Field	Description
ILMI State	Status of ILMI for this interface. Possible ILMI states are: • Link failing • Establishing connection • Configuring peer information • Retrieving network prefix from peer • Registering network prefix to peer • Retrieving ATM network addresses from peer • Registering ATM network addresses to peer • Verifying configuration and ATM network addresses • WaitDevType — ILMI process is initialized and in the process of sending ILMI packets to a neighbor. In this case, the ILMI PVC is not yet established. • UpAndNormal — ILMI traps are received by the neighbors, and the PVC is established.
Peer IP Addr	IP address for the remote (neighbor) end point of the connection.
Peer IF Name	Identifies the interface at the remote (neighbor) end point of the connection.
Active Prefix(s)	Network prefix that is registered from the switch side and is active and valid.

Related Commands

Command	Description
atm ilmi-config disable, on page 5	Disables ILMI on an ATM interface.
atm ilmi-keepalive, on page 7	Enables ILMI keepalives on an ATM interface and configure keepalive polling frequency.

show atm interface atm

To display ATM-specific information about an ATM interface, use the **show atm interface atm** command in EXEC mode.

show atm interface atm *interface-path-id*

Syntax Description

interface-path-id

Physical interface or virtual interface.

Note Use the **show interfaces** command to see a list of all interfaces currently configured on the router.
For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
atm	read

Examples

The following sample output is from the **show atm interface atm** command:

```
RP/0/RP0/CPU0:router# show atm interface atm 0/2/0/3

Interface                : ATM0/2/0/3
AAL Enabled              : AAL5
Max-VP                   : 254
Max-VC                   : 2046
Configured L2 PVPs       : 0
Configured L2 PVCs       : 0
Configured L3 VP-Tunnels : 0
```

show atm interface atm

```

Configured L3 PVCs                : 1
L2 PVPs in Down State             : 0
L2 PVCs in Down State             : 0
L3 VP-Tunnels in Down State       : 0
L3 PVCs in Down State             : 0
Cell packing count                 : 0

Received Side Statistics:
  Received Cells                   : 0
  Received Bytes                   : 0
  Received AAL Packets             : 0

Receive Side Cells Dropped:
  Unrecognized VPI/VCI            : 0

Receive Side AAL5 Packets Dropped:
  Unavailable SAR Buffer           : 0
  Non-Resource Exhaustion         : 0
  Reassembly Timeout              : 0
  Zero Length                     : 0
  Unavailable Host Buffer          : 0
  Packet size exceeds MPS         : 0
  AAL5 Trailer Length Errors      : 0

Transmit Side Statistics:
  Transmitted Cells               : 1899716067
  Transmitted Bytes               : 0
  Transmitted AAL Packets         : 0

Transmit Side Cells Dropped:
  Unrecognized VPI/VCI            : 0

Transmit Side AAL5 Packets Dropped:
  Unavailable SAR Buffer           : 0
  Non-Resource Exhaustion         : 0
  WRED Threshold                  : 0
  WRED Random                     : 0

```

Table 4: show atm interface atm Field Descriptions

Field	Description
Interface	Interface type and instance. The instance is displayed in the <i>rack/slot/module/port</i> format.
Layer2 Transport Port Mode	Displays whether Layer 2 transport mode is enabled or disabled on this interface.
Cell Packing Data Unavailable	Displays whether cell packing is enabled or disabled on this interface.
Received Side Statistics	Displays the following statistical information for the receiving end of this interface: - Received Cells—Total number of cells received from the remote end. - Received Bytes—Total number of bytes received from the remote end. - Received AAL5 Packets—Total number of AAL5 packets received from the remote end.

Field	Description
Receive Side Cells Dropped	Displays the following information about AAL5 packets received from the remote end that were dropped by this end of the interface: • Unavailable SAR Buffer—Total number of AAL5 packets received from the remote end that were dropped because the Segmentation and Reassembly (SAR) buffer was unavailable. • Non-Resource Exhaustion—Total number of packets received from the remote end that were discarded due to events other than resource exhaustion, including raw or non AAL5 cells. • Reassembly Timeout—Number of AAL5 packets received from the remote end that were dropped because the reassembly of those packets took too long and the system timed-out. • CRC-32 Errors—Number of AAL5 packets received from the remote end that were dropped due to CRC-32 errors. • Zero Length—Number of AAL5 packets received from the remote end that were dropped due to • Unavailable Host Buffer—Number of AAL5 packets received from the remote end that were dropped because the host buffer was unavailable. • Packet size exceeds MPS—Number of AAL5 packets received from the remote end that were dropped due to a mismatch between the actual packet length and the reassembled packet length. • AAL5 Trailer Length Errors—Number of AAL5 packets received from the remote end that were dropped because their packet length was bigger than the AAL5 trailer.

Field	Description
Receive Side AAL5 Packets Dropped	Displays the number of received AAL5 packet drops that occurred on this interface due to the following errors: • Unavailable SAR Buffer—Number of AAL5 packets that were dropped because the SAR buffer was unavailable. • Non-Resource Exhaustion— • Reassembly Timeout— • CRC-32 Errors— • Zero Length— • Unavailable Host Buffer— • Packet size exceeds MPS— • AAL5 Trailer Length Errors—
Receive Side Cells Dropped	Number of unrecognized VPI and VCI cells received from the remote end that were dropped.

Field	Description
Receive side AAL5 Packets Dropped:	Displays the following information about AAL5 packets received from the remote end that were dropped by this end of the interface: • Unavailable SAR Buffer—Total number of AAL5 packets received from the remote end that were dropped because the Segmentation and Reassembly (SAR) buffer was unavailable. • Non-Resource Exhaustion—Total number of packets received from the remote end that were discarded due to events other than resource exhaustion, including raw or non AAL5 cells. • Reassembly Timeout—Number of AAL5 packets received from the remote end that were dropped because the reassembly of those packets took too long and the system timed-out. • CRC-32 Errors—Number of AAL5 packets received from the remote end that were dropped due to CRC-32 errors. • Zero Length—Number of AAL5 packets received from the remote end that were dropped due to • Unavailable Host Buffer—Number of AAL5 packets received from the remote end that were dropped because the host buffer was unavailable. • Packet size exceeds MPS—Number of AAL5 packets received from the remote end that were dropped due to a mismatch between the actual packet length and the reassembled packet length. • AAL5 Trailer Length Errors—Number of AAL5 packets received from the remote end that were dropped because their packet length was bigger than the AAL5 trailer.

Field	Description
Transmit Side Statistics	Displays the following statistical information for the transmit side of this interface: • Transmitted Cells—Total number of cells that were transmitted to the remote end. • Transmitted Bytes—Total number of bytes that were transmitted to the remote end. • Transmitted AAL5 Packets—Total number of AAL5 packets that were transmitted to the remote end.
Transmit side Cells Dropped	Number of VPI and VCI cells transmitted to the remote end that were dropped because they were not recognized by the remote end.
Transmit Side AAL5 Packets Dropped	Displays the following information about transmitted AAL5 packets that were dropped by the remote end: • Unavailable SAR Buffer—Number of transmitted AAL5 packets that were dropped by the remote end because the Segmentation and Reassembly (SAR) buffer was unavailable. • Non-Resource Exhaustion—Total number of packets dropped by the remote end due to events other than resource exhaustion, including raw or non AAL5 cells. • WRED Threshold—Gives the value of the packets dropped by WRED QoS mechanism. It is dropped when queue length exceeds the configured WRED max-threshold value. • WRED Random—Gives the value of the early dropped packets by WRED QoS mechanism. It is early dropped when queue length is between WRED min-threshold and max-threshold.
Cell-packing statistics	Displays the following cell packing statistics for the specified interface: • Average number of cells sent—Average number of cells in a packed cell that were packed on this interface. • Average number of cells received—Average number of cells in a packed cell that were received by this interface.

Related Commands

Command	Description
interface atm , on page 26	Configures an ATM interface and enters ATM interface configuration mode.

show atm pvc

To display ATM permanent virtual circuit (PVC) and traffic information for the entire router, or a specific VPI/VCI or ATM interface, use the **show atm pvc** command in EXEC mode.

show atm pvc [*vpi/vci*] **interface atm** **interface-path-id**

Syntax Description

<i>vpi/vci</i>	(Optional) ATM virtual path identifier (VPI) and virtual channel identifier (VCI) numbers. The absence of the slash (/) and a <i>vpi</i> value defaults the <i>vpi</i> value to 0. Note A VPI of 0 is not applicable to VP-tunnels.
interface atm	(Optional) ATM interface for which you want to display information. Use the <i>interface-path-id</i> argument to specify the ATM interface.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

Entering the **show atm pvc** command without specifying the *vpi/vci* argument or **interface atm** *instance* keyword argument displays ATM PVC and traffic information for the entire router.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
atm	read

Examples

The following sample output is from the **show atm pvc** command:

```
RP/0/RP0/CPU0:router# show atm pvc
```

Interface	VPI	VCI	Type	Encaps	SC	Peak Kbps	Avg/Min Kbps	Burst Cells	Sts
ATM0/1/0/0.230	15	230	PVC	AAL0	UBR	622000	N/A	N/A	UP
ATM0/1/0/3.19	17	19	PVC	SNAP	UBR	622000	N/A	N/A	UP

Table 5: show pvc (all PVCs) Field Descriptions

Field	Description
Interface	Interface type and instance. The instance is displayed in the <i>rack/slot/module/port</i> format.
VPI	ATM network virtual path identifier (VPI) associated with the specified interface.
VCI	ATM network virtual channel identifier (VCI) associated with the specified interface.
Type	Type of VPI/VCI associated with the specified interface. In this release, only PVCs are supported.

Field	Description
Encaps	Encapsulation type that configured on the specified interface. Possible encapsulation types follow: • ILMI—Interim Local Management Interface. ILMI encapsulation is available for point-to-point PVCs only. • MUX—aal5mux ipv4; IPv4 encapsulation for multiplex (MUX)-type VCs. MUX encapsulation is available for point-to-point PVCs only. • NLPID—aal5nlpid; AAL and encapsulation type that allows ATM interfaces to interoperate with High-Speed Serial Interfaces (HSSIs), which are using an ATM data service unit (ADSU) and running ATM-Data Exchange Interface (DXI). Supported on ATM PVCs only. NLPID encapsulation is available for point-to-point PVCs only. • SNAP—aal5snap; AAL and encapsulation type that supports Inverse ARP. Logical Link Control/Subnetwork Access Protocol precedes the protocol datagram. SNAP encapsulation is available for point-to-point PVCs only. • AAL0— • AAL5— Note To disable ILMI on a point-to-point ATM interface, use the atm ilmi-config disable command in interface configuration mode for an ATM interface. To configure aal5mux, aal5nlpid, or aal5snap encapsulation on an ATM interface, use the encapsulation command in ATM VC-class configuration mode, and then assign that VC-class to the appropriate ATM main interface.

Field	Description
SC	Service class that is assigned to the specified ATM interface. Possible service classes follow: • cbr • ubr • vbr-nrt • vbr-rt Note To modify a configured ATM service class, use the shape command in the appropriate command mode.
Peak Kbps	Peak output rate for the bit rate in kbps. Note To modify the Peak output rate, use the shape command.
Avg/Min Kbps	Number of kilobits per second sent at the average (sustained) rate. Note To modify the average (or sustained) rate, use the shape command.
Burst cells	Identifies the burst cell size in terms of number of cells. This number is the maximum number of ATM cells the VC can send at the peak rate. Note To modify the burst cell size, use the shape command.
Sts	Status of the PVC. Can be “UP” or “DOWN.”

The following sample output is from the **show atm pvc** command with the *vpi/vci* argument included:

```
RP/0/RP0/CPU0:router# show atm pvc 10/100

Detailed display of VC(s) with VPI/VCI = 10/100

ATM0/2/0/3.100: VPI: 10 VCI: 100
UBR, PeakRate: 622000 Kbps
AAL5-LLC/SNAP
OAM frequency: 10 second(s), OAM retry frequency: 1 second(s),
OAM up retry count: 3, OAM down retry count: 5,
OAM Keep-vc-up: False, OAM AIS-RDI failure: None,
OAM AIS-RDI down count: 1, OAM AIS-RDI up time: 3 second(s),
OAM Loopback status: No loopback enabled,
OAM VC state: Loopback Not verified,
VC is not managed by OAM,

OAM cells received: 0,
F5 InEndLoop: 0, F5 InSegLoop: 0,
F5 InEndAIS: 0, F5 InSegAIS: 0,
F5 InEndRDI: 0, F5 InSegRDI: 0,
OAM cells sent: 0,
F5 OutEndLoop: 0, F5 OutSegLoop: 0,
F5 OutEndAIS: 0, F5 OutSegAIS: 0,
```

show atm pvc

```

F5 OutEndRDI: 0,  F5 OutSegRDI: 0,
OAM cells drops: 0

InPkts: 0          OutPkts: 0
InBytes: 0         OutBytes: 0
WRED pkt drop: 0
Non WRED pkt drop: 0

Internal state: READY
Status: UP

```

Table 6: show atm pvc Field Descriptions

Field	Description
Detailed display of VC(s) with VPI/VCI	Displays the following general information for the specified PVC: • VPI and VCI in the <i>VPI/VCI</i> format • associated interface type and instance in the <i>type rack/slot/module/port</i> format. • associated VPI • associated VCI • Service class that is assigned to the specified ATM interface. Possible service classes follow: ◦ cbr ◦ ubr ◦ vbr-nrt ◦ vbr-rt • Peak line rate (bandwidth) required for the specified ATM interface, in kilobits per second. • Whether ILMI is enabled on the interface. Note To modify a configured ATM service class, use the shape command in the appropriate command mode. Note To modify the bandwidth required for an ATM interface (peak line rate), use the shape command in interface configuration mode.
OAM frequency	Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the up or down state of a PVC is being verified. Note To modify the OAM frequency, use the oam-pvc manage command in ATM virtual circuit (VC) class configuration mode.

Field	Description
OAM retry frequency	Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the up or down state is being verified. Note To modify the OAM retry frequency, use the oam retry command in the appropriate command mode.
OAM up retry count	Number of consecutive end-to-end F5 OAM loopback cell responses that must be received in order to modify a PVC state to up.
OAM down retry count	Number of consecutive unreceived end-to-end F5 OAM loopback cell responses allowed before a PVC state changes to down.
OAM AIS-RDI down count:	Number of OAM AIS/RDI cells received on a PVC before it is brought down. Note To modify the OAM AIS-RDI down count, use the oam ais-rdi command in ATM VC-class configuration mode
OAM AIS-RDI up time	Interval after which a PVC is brought up if it has not received any OAM AIS/RDI cells. Note To modify the OAM AIS-RDI uptime, use the oam ais-rdi command in ATM VC-class configuration mode
OAM Loopback status	Status of end-to-end F5 OAM loopback cell generation for this VC. Possible value follow: • No loopback enabled—No loopback is enabled on this interface. • OAM Disabled—End-to-end F5 OAM loopback cell generation is disabled. • OAM Sent—OAM cell was sent. • OAM Received—OAM cell was received. • OAM Failed—OAM reply was not received within the frequency period or contained bad correlation tag.

Field	Description
OAM VC state	Current state of the specified VC. Possible VC states follow: • AIS/RDI—The VC received AIS/RDI cells. End-to-end F5 OAM loopback cells are not sent in this state. • Down Retry—An OAM loopback failed. End-to-end F5 OAM loopback cells are sent at retry frequency to verify that the VC is really down. After down-count unsuccessful retries, the VC goes to the Not Verified state. • Loopback Not Managed—VC is not being managed by OAM. • Loopback Not Verified—VC has not been verified by end-to-end F5 OAM loopback cells. AIS and RDI conditions are cleared. • Up Retry—An OAM loopback was successful. End-to-end F5 OAM loopback cells are sent at retry frequency to verify the VC is really up. After up-count successive and successful loopback retries, the VC goes to the Verified state. • Loopback Verified—Loopbacks are successful. AIS/RDI cell was not received.
OAM cells received	Number of OAM cells that have been received by this interface.
F5 InEndLoop:	Number of end-to-end F5 OAM loopback cells received by this interface.
F5 InSegLoop	Number of segment F4 OAM loopback cells received by this interface.
F5 InAIS	Number of F4 OAM AIS cells received by this interface.
F5 InRDI	Number of F4 OAM RDI cells received by this interface.
OAM cells sent	Total number of OAM cells sent on this VC.
F5 OutEndLoop	Number of end-to-end F5 OAM loopback cells sent from this interface.

Field	Description
F5 OutSegLoop	Number of segment F5 OAM loopback cells sent from this interface.
F5 OutAIS	Number of F5 OAM AIS cells sent from this interface.
F5 OutRDI	Number of F5 OAM RDI cells sent from this interface.
OAM cells drops	Number of OAM cells dropped (or flushed) by this interface.
InPkts	Total number of packets received on this VC. This number includes all fast-switched and process-switched packets.
OutPkts	Total number of packets sent on this VC. This number includes all fast-switched and process-switched packets.
InBytes	Total number of bytes received on this VC. This number includes all fast-switched and process-switched bytes.
OutBytes	Total number of bytes sent on this VC. This number includes all fast-switched and process-switched bytes.
WRED pkt drop	Total number of AAL5 packets that were dropped by this interface because their size exceeded the maximum threshold set for Weighted Random Early Discard (WRED).
Non WRED pkt drop	Total number of dropped AAL5 packets that did not exceed the maximum threshold set for Weighted Random Early Discard (WRED).
Internal state	Internal PVC state.
Status	Current status of this PVC. Can be “Up” or “Down.”

Related Commands

Command	Description
pvc (ATM), on page 43	Creates an ATM PVC with ILMI encapsulation and enters ATM virtual circuit configuration mode.

show atm pvp

To display ATM PVP and traffic information for the entire router, or a specific VPI or ATM interface, use the **show atm pvp** command in EXEC mode.

show atm pvp [*vpi*] **interface atm instance**

Syntax Description

<i>vpi</i>	(Optional) ATM virtual path identifier (VPI) number. Replace <i>vpi</i> with the VPI of the PVP whose information you want to display.
interface atm instance	(Optional) Displays all PVCs on the specified ATM interface.
Note	To determine the appropriate form of the <i>instance</i> argument, see your ATM network module, port adapter, or router documentation.

Command Default

Entering the **show atm pvp** command without specifying the *vpi* argument or **interface atm instance** keyword argument displays ATM PVP and traffic information for the entire router.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
atm	read

Examples

The following example shows how to display ATM PVP and traffic information for the entire router:

RP/0/RP0/CPU0:router# **show atm pvp interface atm 0/3/0/1**

Interface	VPI	SC	Peak Kbps	Avg/Min Kbps	Burst Cells	Sts
ATM0/3/0/1.100	100	UBR	155000	N/A	N/A	UP

Table 7: show pvp (all PVPs) Field Descriptions

Field	Description
Interface	Interface type and instance. The instance is displayed in the <i>rack/slot/module/port</i> format.
VPI	ATM network virtual path identifier (VPI) associated with the specified interface.
SC	Service class that is assigned to the specified ATM interface. Possible service classes follow: • cbr • ubr • vbr-nrt • vbr-rt Note To modify a configured ATM service class, use the shape command in the appropriate command mode.
Peak Kbps	Peak output rate for the bit rate in kbps. Note To modify the Peak output rate, use the shape command.
Avg/Min Kbps	Number of kilobits per second sent at the average (sustained) rate. Note To modify the average (or sustained) rate, use the shape command.
Burst cells	Identifies the burst cell size in terms of number of cells. This number is the maximum number of ATM cells the PVP can send at the peak rate. Note To modify the burst cell size, use the shape command.
Sts	Status of the PVP. Can be “UP” or “DOWN.”

The following example shows how to display ATM PVP and traffic information for the a specific VPI:

```
RP/0/RP0/CPU0:router# show atm pvp 100
```

```
Detailed display of L2PVP(s) with VPI = 100
```

```
ATM0/3/0/1.100: VPI: 100
UBR, PeakRate: 155000 Kbps
AAL0
OAM frequency: 10 second(s), OAM retry frequency: 1 second(s),
OAM up retry count: 3, OAM down retry count: 5,
OAM AIS-RDI down count: 1, OAM AIS-RDI up time: 3 second(s),
OAM Loopback status: No loopback enabled,
```

```

OAM L2PVP state: Unknown,
L2PVP is not managed by OAM,

OAM cells received: 0,
F4 InEndLoop: 0, F4 InSegLoop: 0,
F4 InEndAIS: 0, F4 InSegAIS: 0,
F4 InEndRDI: 0, F4 InSegRDI: 0,
OAM cells sent: 8948,
F4 OutEndLoop: 0, F4 OutSegLoop: 0,
F4 OutEndAIS: 8948, F4 OutSegAIS: 0,
F4 OutEndRDI: 0, F4 OutSegRDI: 0,
OAM cells drops: 0

InPkts: 8948                OutPkts: 0
InBytes: 465296            OutBytes: 0

Internal state: READY
Status: UP

```

Table 8: show atm pvp Field Descriptions

Field	Description
ATM0/1/0/0.30	Associated interface type and instance in the <i>type rack/slot/module/port.subinterface</i> format. • Service class that is assigned to the specified ATM interface. Possible service classes follow: ◦ cbr ◦ ubr ◦ vbr-nrt ◦ vbr-rt • Peak line rate (bandwidth) required for the specified ATM interface, in kilobits per second. Note To modify a configured ATM service class, use the shape command in the appropriate command mode. Note To modify the bandwidth required for an ATM interface (peak line rate), use the shape command in interface configuration mode.
VPI	VPI associated with the specified PVP.

Field	Description
UBR	Service class that is assigned to the specified ATM interface. The example shows that vbr-rt is assigned to the interface that hosts the specified PVP. Possible service classes are: • cbr • ubr • vbr-nrt • vbr-rt
PeakRate	Peak output rate for the bit rate in kbps. Note To modify the peak output rate, use the shape command.
AAL0	ATM adaptation layer (AAL) and encapsulation type for the PVP. Currently, only AAL0 is the only supported encapsulation type for PVPs.
OAM frequency	Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the up or down state of a PVC is being verified. Note To modify the OAM frequency, use the oam-pvc manage command in ATM virtual circuit (VC) class configuration mode.
OAM retry frequency	Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the up or down state is being verified. Note To modify the OAM retry frequency, use the oam retry command in the appropriate command mode.
OAM up retry count	Number of consecutive end-to-end F5 OAM loopback cell responses that must be received in order to modify a PVC state to up.
OAM down retry count	Number of consecutive unreceived end-to-end F5 OAM loopback cell responses allowed before a PVC state changes to down.
OAM AIS-RDI down count	Number of OAM AIS/RDI cells received on a PVC before it is brought down. Note To modify the OAM AIS-RDI down count, use the oam ais-rdi command in ATM VC-class configuration mode

Field	Description
OAM AIS-RDI up time	Interval after which a PVC is brought up if it has not received any OAM AIS/RDI cells. Note To modify the OAM AIS-RDI uptime, use the oam ais-rdi command in ATM VC-class configuration mode
OAM Loopback status	Status of end-to-end F5 OAM loopback cell generation for this VC. Possible value follow: • No loopback enabled—No loopback is enabled on this interface. • OAM Disabled—End-to-end F5 OAM loopback cell generation is disabled. • OAM Sent—OAM cell was sent. • OAM Received—OAM cell was received. • OAM Failed—OAM reply was not received within the frequency period or contained bad correlation tag.
OAM L2PVP state	Current state of the specified VC. Note OAM management is not supported on Layer 2 PVPs in the current release of Cisco IOS XR software.
OAM cells received	Number of OAM cells that have been received by this interface.
F4 InEndLoop:	Number of end-to-end F4 OAM loopback cells received by this interface.
F4 InSegLoop	Number of segment F4 OAM loopback cells received by this interface.
F4 InEndAIS	Number of F4 OAM AIS cells received by this interface.
F4 InSegAIS	Number of segment F4 OAM AIS cells received by this interface.
F4 InEndRDI	Number of F4 OAM RDI cells received by this interface.
F4 InSegRDI	Number of F4 segment OAM RDI cells received by this interface.

Field	Description
OAM cells drops	Number of OAM cells dropped (or flushed) by this interface.
InPkts	Total number of packets received on this VC. This number includes all fast-switched and process-switched packets.
OutPkts	Total number of packets sent on this VC. This number includes all fast-switched and process-switched packets.
InBytes	Total number of bytes received on this VC.
OutBytes	Total number of bytes sent on this VC.
Internal state	Internal PVC state.
Status	Current status of this PVC. Can be “Up” or “Down.”

Related Commands

Command	Description
pvp (ATM), on page 47	Creates an ATM PVP and enters ATM layer 2 transport PVP configuration mode.

show atm vc-class

To display information about all ATM virtual circuit (VC) classes on the router or for a specific ATM VC-class, use the **show atm vc-class** command in EXEC mode.

show atm vc-class *vc-class-name*

Syntax Description

<i>vc-class-name</i>	Name of the VC-class whose information you want to display.

Command Default

Entering the **show atm vc-class** command without specifying the *vc-class-name* argument displays ATM PVC and traffic information for the entire router.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
atm	read

Examples

The following sample output is from the **show atm vc-class** command:

```
RP/0/RP0/CPU0:router# show atm vc-class
ATM vc-class class1
  encapsulation      - aal5mux ip
  shape              - cbr 100000
  oam ais-rdi        - 35
  oam retry          - 300
  oam-pvc            - manage 300
ATM vc-class class2
  encapsulation      - aal5nlpid
  shape              - ubr 40000
```

```

oam ais-rdi          - 30
oam retry            - 30
oam-pvc              - manage 300

ATM vc-class class3

encapsulation        - aal5snap
shape                - vbr-nrt 60000 60000 1000
oam ais-rdi          - 30
oam retry            - 30
oam-pvc              - manage 300

```

Table 9: show atm vc-class Field Descriptions

Field	Description
encapsulation	Type of ATM adaptation layer (AAL) encapsulation type that is enabled on the specified VC-class. Possible AAL encapsulation types follow: • aal5mux ipv4—IPv4 encapsulation for multiplex (MUX)-type VCs • aal5nlpid—AAL and encapsulation type that allows ATM interfaces to interoperate with High-Speed Serial Interfaces (HSSIs), which are using an ATM data service unit (ADSU) and running ATM-Data Exchange Interface (DXI). Supported on ATM PVCs only. • aal5snap—AAL and encapsulation type that supports Inverse ARP. Logical Link Control/Subnetwork Access Protocol (LLC/SNAP) precedes the protocol datagram. Note To modify the AAL encapsulation type on an interface, use the encapsulation command in ATM VC-class configuration mode.

Field	Description
shape	Displays traffic shaping information for the service class that is assigned to the specified VC-class. Possible service classes follow: • cbr—command output shows the peak output rate for the bit rate in kbps. • ubr—command output shows the peak output rate for the bit rate in kbps. • vbr-nrt—command output shows the peak output rate, sustained output rate, and burst size for the bit rate in kbps. • vbr-rt—command output shows the peak output rate, sustained output rate, and burst size for the bit rate in kbps. Note To modify a configured ATM service class and peak output rate for the bit rate, use the shape command in the appropriate command mode.
oam ais-rdi	Displays the maximum number of OAM AIS/RDI cells that can be received on a PVC before it is brought down. Note Use the oam ais-rdi command in to modify the current configuration for this field.
oam retry	Displays the following information related to F5 OAM loopback cells, if this information was configured for the specified VC-class: • Number of consecutive end-to-end F5 OAM loopback cell responses that must be received to change a connection state to up. (Retry count) • Number of consecutive unreceived end-to-end F5 OAM loopback cells allowed on a PVC before its state changes to down. (down count) • Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted when a change in the up or down state is being verified. (retry frequency) Note Use the oam retry command to modify the current configuration for this field. Note If the oam retry command was not use to configure the F5 OAM loopback retry count, down count, or retry frequency, then this information is not displayed in the command output for the show atm vc-class command.

Field	Description
oam-pvc	Frequency (in seconds) at which end-to-end F5 OAM loopback cells are transmitted on this PVC. Range is from 0 through 600. Note Use the oam-pvc manage command to modify the current configuration for this field.

The following sample output is from the **show atm vc-class** command with the *vc-class-name* argument included:

```
RP/0/RP0/CPU0:router# show atm vc-class class1
```

```
ATM vc-class class1
```

```
encapsulation      - aal5mux ip
shape              - cbr 100000
oam ais-rdi        - 35
oam retry          - 300
oam-pvc            - manage 300
```

Related Commands

Command	Description
class-vc, on page 21	Attaches a VC class to an ATM PVC.
vc-class atm, on page 93	Creates a VC class for an ATM PVC or an ATM interface and enters VC-class configuration mode.

show controllers atm

To display information about the physical status of the ATM interface, use the **show controllers atm** command in EXEC mode.

show controllers atm *interface-path-id* [**all**|**traffic** {**f4oam**|**port**|**vc vpi/vci** | **vp vpi**}]

Syntax Description

<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
f4oam	Displays information about the ATM layer f4oam traffic that is transmitted and received on the specified interface.
port	(Optional) Displays information about the ATM layer traffic that is transmitted and received by the ports associated with the specified interface.
vc vpi/vci	(Optional) Displays information about the ATM layer traffic carried by specific ATM VC (virtual channel). Replace <i>vpi/vci</i> with the ATM virtual path identifier (VPI) and virtual channel identifier (VCI) of the VC whose information you want to display.
vp vpi	(Optional) Displays information about the ATM layer traffic carried by specific ATM virtual path. Replace <i>vpi</i> with the ATM virtual path identifier (VPI) whose information you want to display.

Command Default

Entering the **show controllers atm** command without specifying the *instance* argument displays ATM controller status and configuration information for the entire router.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.7.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows partial output from the **show controllers atm** command:

```
RP/0/RP0/CPU0:router# show controllers atm 0/6/0/0
```

```
SAR Counters:
  tx_packets           :4085                tx_bytes           :212420
  tx_total_resource_errs:0                  tx_total_other_errs :0
  tx_wred_thresh_drops :0                  tx_wred_random_drops :0
  rx_packets           :0                  rx_bytes           :0
  rx_total_resource_errs:0                  rx_total_other_errs :0
  rx_buffer_exhaust_errs:0                 rx_CRC32_errors     :0
  rx_packet_abort_errs :0                  rx_trailer_len_errs :0
  rx_mps_errors        :0                  rx_reassembly_timeout:0

The following are per-SAR counters:
Reassembly SAR:
  sys_rx_unopen_vc_cls :0                  sys_tx_unopen_vc_cls :0
  sys_ecc_errors        :0                  sys_ecc_and_addr     :      0xf
  ffffffff              :      0x0
  sys_ecc_or_addr       :
Segmentation SAR:
  sys_rx_unopen_vc_cls :0                  sys_tx_unopen_vc_cls:0
  sys_ecc_errors        :0                  sys_ecc_and_addr     :      0xf
  ffffffff              :      0x0
  sys_ecc_or_addr       :
RSAR 0: (6.0.2.1c)
RSAR Build ID= E7EE
SSAR 0: (6.0.2.1c)
SSAR Build ID= 570

--More--
```

Table 10: show controllers atm Field Descriptions

Field	Description
SAR Counters	Counters that provide information about the Segmentation and Reassembly (SAR) chip.
tx_packets	Number of AAL5 packets transmitted.

Field	Description
tx_bytes	A 64-bit counter of the bytes transmitted on this interface, including OAM cells and AAL5 header encapsulations (such as AAL5SNAP). This should be approximately the total number of bytes transmitted on each of the VCs.
tx_total_resource_errs	Total number of packets that were not transmitted because of any resource exhaustion error. This does not necessarily imply an error, because this counter includes tx_wred_thresh_drops and tx_wred_random_drops, as well as packet drops due to complete buffer exhaustion on the SAR. This should be equal to the sum of the number of resource errors that occur on all the VCs.
tx_total_other_errs	Total number of packets that were not transmitted because of any error other than resource exhaustion, but not including no-vc drops. This includes malformed packets, CRC errors, and so on. This should be approximately the total number of tx_other_errors that occur on all the VCs on this interface.
tx_wred_thresh_drops	Total number of WRED maximum threshold drops on this interface. This counter is included in the tx_total_resource_errs counter.
tx_wred_random_drops	Total number of WRED random drops on this interface. This counter is included in the tx_total_resource_errs counter.
rx_packets	Total number of packets reassembled on this interface by the SAR, including OAM cells.
rx_bytes	Number of AAL5 packets received on this interface.
rx_total_resource_errs	Total number of packet reassemblies that failed due to resource exhaustion. This error should not occur if the queue thresholds are not oversubscribed. This error includes rx_buffer_exhaust_errs.
rx_total_other_errs	Total number of packet reassemblies that failed due to errors besides resource exhaustion (not including “no-vc” cells), including rx_crc32_errors, rx_packet_abort_errs, rx_trailer_len_errs, rx_mps_errors, and rx_reassembly_timeout.

Field	Description
rx_buffer_exhaust_errs	Total number of packet reassemblies that failed due to complete buffer exhaustion on the SAR. This error should not occur if the queue thresholds are not oversubscribed. This is included in rx_total_resource_errs.
sys_tx_unopen_vc_cls	Total number of packets transmitted by this endpoint that failed due to an error other than those listed in the show controllers atm command output.
Reassembly SAR	Counters that provide information specific to the reassembly chip.
sys_ecc_and_addr	Total number of single bit end and addressing errors detected on the reassembly SAR.
sys_ecc_errors	Total number of single bit errors detected on the reassembly SAR.
sys_ecc_or_addr	Total number of single bit end or addressing errors detected on the reassembly SAR.
Segmentation SAR	Counters that provide information specific to the segmentation chip.
sys_tx_unopen_vc_cls	Total number of packet reassemblies transmitted by this endpoint that failed due to errors other than those listed in the show controllers atm command output.
sys_rx_unopen_vc_cls	Total number of packet reassemblies received by this endpoint that failed due to errors other than those listed in the show controllers atm command output.
rx_CRC32_errors	Total number of packet reassemblies that failed due to an invalid AAL5 CRC32 trailer. This is included in rx_total_other_errs.
rx_packet_abort_errs	Total number of packet reassemblies that failed due to receiving a trailer length of 0. This is included in rx_total_other_errs.
rx_trailer_len_errs	Total number of packet reassemblies that failed due to a packet whose AAL5 trailer had an invalid trailer length. This is included in rx_total_other_errs.
rx_mps_errors	Total number of packet reassemblies that failed due to a packet size greater than the maximum allowed packet size. This is included in rx_total_other_errs.

Field	Description
rx_reassembly_timeout	Total number of packet reassemblies that failed due to timing out before receiving the last cell of a packet. This is included in rx_total_other_errs.
sys_rx_unopen_vc_cls	Packets received on nonexistent VC.
RSAR 0	RSAR ID.
RSAR Build ID	Unique number that identifies the RSAR build.
SSAR 0	SSAR ID.
SSAR Build ID	Unique number that identifies the SAR build.

Related Commands

Command	Description
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.

shutdown (ATM)

To disable an ATM interface, use the **shutdown** command in interface configuration mode. To re-enable an ATM interface, use the **no** form of this command.

shutdown

no shutdown

Syntax Description This command has no keywords or arguments.

Command Default The ATM interface is up.

Command Modes Interface configuration (config-if)

Command History	Release	Modification
	Release 3.7.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show interface atm** command in EXEC mode to verify that the ATM interface is administratively up or down.

Task ID	Task ID	Operations
	interface	read, write

Examples The following example shows how to bring down an ATM interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface atm 0/2/0/0
RP/0/RP0/CPU0:router(config-if)# shutdown
```

The following example shows how to re-enable an ATM interface that has been brought down with the **shutdown** command:

```
RP/0/RP0/CPU0:router# no shutdown
```

Related Commands

Command	Description
show atm interface atm, on page 61	Displays ATM-specific information about an ATM interface.

vc-class atm

To create a virtual circuit (VC) class for an ATM permanent virtual circuit (PVC) or an ATM interface and enter VC-class configuration mode, use the **vc-class atm** command in global configuration mode. To remove a VC-class, use the **no** form of this command.

vc-class atm *name*

no vc-class atm *name*

Syntax Description

<i>name</i>	Name of your VC class.

Command Default

No VC-class is defined.

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 3.9.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you issue the **vc-class atm** command in global configuration mode, the CLI prompt changes to “config-vc-class-atm,” indicating that you have entered the VC-class configuration submode. In the following sample output, the question mark (?) online help function displays all the commands available under the VC-class configuration submode:

```
RP/0/RP0/CPU0:router(config)# vc-class atm classA
RP/0/RP0/CPU0:router(config-vc-class-atm)# ?

  commit          Commit the configuration changes to running
  describe        Describe a command without taking real actions
  do              Run an exec command
  encapsulation    Configure encapsulation
  exit            Exit from this submode
  no              Negate a command or set its defaults
  oam             Configure OAM parameters
  oam-pvc         OAM PVC management configuration
  shape           ATM Traffic Shaping
  show            Show contents of configuration

RP/0/RP0/CPU0:router(config-vc-class-atm)#
```

Task ID

Task ID	Operations
atm	read, write

Examples

The following example shows how to create a VC-class. In this example, the class is called “class1.”

```
RP/0/RP0/CPU0:router(config)# vc-class atm class1  
RP/0/RP0/CPU0:router(config-vc-class-atm)#
```

Related Commands

Command	Description
class-vc, on page 21	Attaches a VC class to an ATM PVC.
show atm vc-class, on page 82	Displays information about all ATM VC classes on the router or for a specific ATM VC-class.



Bidirectional Forwarding Detection Commands on the Cisco IOS XR Software

This module provides command line interface (CLI) commands for configuring Bidirectional Forwarding Detection (BFD) on the Cisco CRS Router.

- [address-family ipv4 unicast \(BFD\), page 97](#)
- [bfd, page 99](#)
- [bfd address-family ipv4 destination, page 101](#)
- [bfd address-family ipv4 fast-detect, page 103](#)
- [bfd address-family ipv4 minimum-interval, page 105](#)
- [bfd address-family ipv4 multiplier, page 108](#)
- [bfd address-family ipv4 timers, page 111](#)
- [bfd fast-detect, page 113](#)
- [bfd minimum-interval, page 116](#)
- [bfd multipath include location, page 120](#)
- [bfd multiplier, page 122](#)
- [clear bfd counters, page 125](#)
- [dampening \(BFD\), page 128](#)
- [echo disable, page 131](#)
- [echo ipv4 source, page 133](#)
- [echo latency detect, page 135](#)
- [echo startup validate, page 137](#)
- [interface \(BFD\), page 139](#)
- [ipv6 checksum, page 142](#)
- [multihop ttl-drop-threshold, page 144](#)
- [show bfd, page 146](#)

- [show bfd client, page 149](#)
- [show bfd counters, page 151](#)
- [show bfd mib session, page 154](#)
- [show bfd multipath, page 157](#)
- [show bfd session, page 159](#)
- [show bfd summary, page 167](#)

address-family ipv4 unicast (BFD)

To enable Bidirectional Forwarding Detection (BFD) fast-detection on a specific IPV4 unicast destination address prefix and on the forwarding next-hop address, use the **address-family ipv4 unicast** command in static route configuration mode. To return the router to the default setting, use the **no** form of this command.

address-family ipv4 unicast *address nexthop* **bfd fast-detect** [**minimum interval** *interval*] [**multiplier** *multiplier*]

no address-family ipv4 unicast *address nexthop* **bfd fast-detect** [**minimum interval** *interval*] [**multiplier** *multiplier*]

Syntax Description

<i>address</i>	Specifies the IPv4 unicast destination address and prefix on which to enable BFD fast-detection.
<i>nexthop</i>	Specifies the next-hop address on which to enable BFD fast-detection.
bfd fast-detect	Enables BFD fast-detection on the specified IPV4 unicast destination address prefix and on the forwarding next-hop address.
minimum interval <i>interval</i>	(Optional) Ensures that the next hop is assigned with the same hello interval. Replace <i>interval</i> with a number that specifies the interval in milliseconds. Range is from 10 through 10000.
multiplier <i>multiplier</i>	(Optional) Ensures that the next hop is assigned with the same detect multiplier. Replace <i>multiplier</i> with a number that specifies the detect multiplier. Range is from 1 through 10.

Command Default

interval: 100
multiplier: 3

Command Modes

Static route configuration mode

Command History

Release	Modification
Release 3.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If the multiplier is changed using the **bfd multiplier** command, the new parameter is used to update all existing BFD sessions for the protocol (BGP, IS-IS, MPLS-TE, or OSPF).

Task ID

Task ID	Operations
static	read, write

Examples

The following example shows how to enable BFD on a static route. In this example, BFD sessions are established with the next-hop 3.3.3.3 when it becomes reachable.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router static
RP/0/RP0/CPU0:router (config-static)# address-family ipv4 unicast 2.2.2.0/24 3.3.3.3 bfd
fast-detection
```

Related Commands

Command	Description
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
show bfd, on page 146	Displays BFD information for a specific location.

bfd

To enter Bidirectional Forwarding Detection (BFD) configuration mode, use the **bfd** command in global configuration mode. To exit BFD configuration mode and return to global configuration mode, use the **no** form of this command.

bfd

no bfd

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Global configuration

Command History	Release	Modification
	Release 3.4.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you issue the **bfd** command in global configuration mode, the CLI prompt changes to “config-bfd,” indicating that you have entered BFD configuration mode. In the following sample output, the question mark (?) online help function displays all the commands available under BFD configuration mode:

```
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# ?

commit      Commit the configuration changes to running
describe    Describe a command without taking real actions
do          Run an exec command
echo        Configure BFD echo parameters
exit        Exit from this submode
interface   Configure BFD on an interface
no          Negate a command or set its defaults
root        Exit to the global configuration mode
show        Show contents of configuration
```

Task ID	Operations
bgp	read, write
ospf	read, write

Task ID	Operations
isis	read, write
mpls-te	read, write

Examples

The following example shows how to enter BFD configuration mode:

```
RP/0/RP0/CPU0:router # configure  
RP/0/RP0/CPU0:router (config) # bfd  
RP/0/RP0/CPU0:router (config-bfd) #
```

Related Commands

Command	Description
echo disable, on page 131	Disables echo mode on a router or on an individual interface or bundle.
interface (BFD), on page 139	Enters BFD interface configuration mode, where you can disable echo mode on an interface.
show bfd, on page 146	Displays BFD information for a specific location.

bfd address-family ipv4 destination

To specify the destination address for BFD sessions on bundle member links, use the **bfd address-family ipv4 destination** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 destination *ip-address*

no bfd address-family ipv4 destination *ip-address*

Syntax Description

<i>ip-address</i>	32-bit IPv4 address in dotted-decimal format (A.B.C.D).

Command Default

No destination IPv4 address is configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command is supported on bundle interfaces only.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example specifies the IPv4 address of 10.20.20.1 as the destination address for the BFD session on an Ethernet bundle interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 destination 10.20.20.1
```

The following example specifies the IPv4 address of 10.20.20.1 as the destination address for the BFD session on a POS bundle interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-POS 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 destination 10.20.20.1
```

Related Commands

Command	Description
bfd address-family ipv4 fast-detect , on page 103	Enables IPv4 BFD sessions on bundle member links.

bfd address-family ipv4 fast-detect

To enable IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 fast-detect** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 fast-detect

no bfd address-family ipv4 fast-detect

Syntax Description This command has no keywords or arguments.

Command Default BFD sessions are disabled.

Command Modes Interface configuration (config-if)

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command is supported on bundle interfaces only.

Task ID	Operations
bundle	read, write

Examples The following example enables IPv4 BFD sessions on member links of an Ethernet bundle:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 fast-detect
```

The following example enables IPv4 BFD sessions on member links of a POS bundle:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-POS 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 fast-detect
```

Related Commands

Command	Description
bfd address-family ipv4 destination , on page 101	Specifies the destination address for BFD sessions on bundle member links.

bfd address-family ipv4 minimum-interval

To specify the minimum interval for asynchronous mode control packets on IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 minimum-interval** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 minimum-interval *milliseconds*

no bfd address-family ipv4 minimum-interval [*milliseconds*]

Syntax Description

milliseconds	Shortest interval between sending BFD control packets to a neighbor. The range is 15 to 30000 milliseconds.
Note	Although the command allows you to configure a minimum of 15 ms, the supported minimum is 33 ms.

Command Default

The default is 150 ms.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command is supported on bundle interfaces only.

The BFD minimum interval is used with a configurable multiplier (**bfd address-family ipv4 multiplier** command) to determine the intervals and failure detection times for both control and echo packets in asynchronous mode on bundle member links.

For example, with a session interval of I and a multiplier of M , the following packet intervals and failure detection times apply for BFD asynchronous mode:

- Value of I —Minimum period between sending of BFD control packets.
- Value of $I \times M$
 - BFD control packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD control packet before the session is declared down.
 - Minimum period between sending of BFD echo packets.

- Value of $(I \times M) \times M$ —BFD echo packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD echo packet before the session is declared down.

When used with bundled VLANs, the following restrictions apply:

- The command specifies control packet intervals only because echo packets are not supported.
- The minimum interval is 250 ms.

The **bfd address-family ipv4 minimum-interval** command in bundle interface configuration overrides the minimum intervals specified by the **bfd minimum-interval** command in other areas of BFD configuration.



Note

When multiple applications share the same BFD session, the application with the most aggressive timer is used locally. Then, the result is negotiated with the peer router.

Keep the following router-specific rules in mind when configuring the minimum BFD interval:

- The maximum rate in packets-per-second (pps) for BFD sessions is linecard-dependent. If you have multiple linecards supporting BFD, then the maximum rate for BFD sessions per system is the supported linecard rate multiplied by the number of linecards.
 - The maximum rate for BFD sessions per linecard is 7000 pps.
- The maximum number of all BFD sessions on the router is 1024.
- The maximum number of all BFD sessions on the router is 1440.

To calculate the rate for BFD sessions on bundle members running in asynchronous mode without echo:

- Divide 1000 by the value of the minimum interval (as specified by the **bfd address-family ipv4 minimum-interval** command). This is also the base rate used per member session with echo:
Asynchronous rate per bundle member = $(1000 / \text{Min-interval})$

To calculate the rate for BFD sessions on bundle members running in asynchronous mode with echo:

- Determine the echo interval, which is the value of the minimum interval (specified by the **bfd address-family ipv4 minimum-interval** command) multiplied by the multiplier value (specified by the **bfd address-family ipv4 multiplier** command).
Echo interval = $(\text{Min-interval} \times \text{Multiplier})$
- Calculate the overall rate supported for all members on the bundle:
Ethernet bundle rate = $(1000 / \text{Echo interval}) \times 64$
POS bundle rate = $(1000 / \text{Echo interval}) \times 253$
- Add the asynchronous base rate per bundle member to find the total rate for all bundle links:
Total bundle rate = Ethernet or POS bundle rate + $(\text{Base asynchronous rate} \times \text{Number of links})$

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example specifies that control packets will be sent at a minimum interval of 200 ms for IPv4 BFD sessions on member links of an Ethernet bundle:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 minimum-interval 200
```

The following example specifies that control packets will be sent at a minimum interval of 200 ms for IPv4 BFD sessions on member links of a POS bundle:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-POS 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 minimum-interval 200
```

Related Commands

Command	Description
bfd minimum-interval , on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd address-family ipv4 multiplier , on page 108	Specifies a number that is used as a multiplier with the minimum interval to determine BFD control and echo packet failure detection times and echo packet transmission intervals for IPv4 BFD sessions on bundle member links.

bfd address-family ipv4 multiplier

To specify a number that is used as a multiplier with the minimum interval to determine BFD control and echo packet failure detection times and echo packet transmission intervals for IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 multiplier** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 multiplier *multiplier*

no bfd address-family ipv4 multiplier [*multiplier*]

Syntax Description

multiplier

Number from 2 to 50.

Note

Although the command allows you to configure a minimum of 2, the supported minimum is 3.

Command Default

The default multiplier is 3.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command is supported on bundle interfaces only.

The BFD multiplier is used with a configurable minimum interval (**bfd address-family ipv4 minimum-interval** command) to determine the intervals and failure detection times for both control and echo packets in asynchronous mode on bundle member links.

For example, with a session interval of *I* and a multiplier of *M*, the following packet intervals and failure detection times apply for BFD asynchronous mode:

- Value of *I*—Minimum period between sending of BFD control packets.
- Value of *I* x *M*
 - BFD control packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD control packet before the session is declared down.
 - Minimum period between sending of BFD echo packets.

**Note**

The maximum echo packet interval for BFD on bundle member links is the minimum of either 30 seconds or the asynchronous control packet failure detection time.

- Value of $(I \times M) \times M$ —BFD echo packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD echo packet before the session is declared down.

Keep the following router-specific rules in mind when configuring the minimum BFD interval:

- The maximum rate in packets-per-second (pps) for BFD sessions is linecard-dependent. If you have multiple linecards supporting BFD, then the maximum rate for BFD sessions per system is the supported linecard rate multiplied by the number of linecards.
 - The maximum rate for BFD sessions per linecard is 7000 pps.
- The maximum number of all BFD sessions per linecard is 1024.
- The maximum number of all BFD sessions per linecard is 1440.

To calculate the rate for BFD sessions on bundle members running in asynchronous mode without echo:

- Divide 1000 by the value of the minimum interval (as specified by the **bfd address-family ipv4 minimum-interval** command). This is also the base rate used per member session with echo:
Asynchronous rate per bundle member = $(1000 / \text{Min-interval})$

To calculate the rate for BFD sessions on bundle members running in asynchronous mode with echo:

- Determine the echo interval, which is the value of the minimum interval (specified by the **bfd address-family ipv4 minimum-interval** command) multiplied by the multiplier value (specified by the **bfd address-family ipv4 multiplier** command).
Echo interval = $(\text{Min-interval} \times \text{Multiplier})$
- Calculate the overall rate supported for all members on the bundle:
Ethernet bundle rate = $(1000 / \text{Echo interval}) \times 64$
POS bundle rate = $(1000 / \text{Echo interval}) \times 253$
- Add the asynchronous base rate per bundle member to find the total rate for all bundle links:
Total bundle rate = Ethernet or POS bundle rate + $(\text{Base asynchronous rate} \times \text{Number of links})$

Task ID

Task ID	Operations
bundle	read, write

Task ID**Examples**

The following example specifies the following packet intervals and failure detection times for IPv4 BFD sessions on member links with asynchronous echo mode on an Ethernet bundle:

- 200 ms control packet interval

- 600 ms control packet failure detection interval
- 600 ms echo packet interval
- 1800 ms echo packet failure detection interval

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 minimum-interval 200
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 multiplier 3
```

The following example specifies the same packet intervals and failure detection times for IPv4 BFD sessions on member links of a POS bundle:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-POS 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 minimum-interval 200
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 multiplier 3
```

Related Commands

Command	Description
bfd address-family ipv4 minimum-interval , on page 105	Specifies the minimum interval for asynchronous mode control packets on IPv4 BFD sessions on bundle member links.
bfd minimum-interval , on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.

bfd address-family ipv4 timers

To configure timers to allow for delays in receipt of BFD state change notifications (SCNs) from peers before declaring a link bundle BFD session down for IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 timers** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 timers [*start*| *nbr-unconfig*] *seconds*

no bfd address-family ipv4 timers [*start*| *nbr-unconfig*] *seconds*

Syntax Description

start <i>seconds</i>	Number of seconds after startup of a BFD member link session to wait for the expected notification from the BFD peer to be received, so that the session can be declared up. If the SCN is not received after that period of time, the BFD session is declared down. The range is 60 to 3600. Note In Cisco IOS XR Releases 4.0 and 4.0.1, the available minimum is 30, but is not recommended.
nbr-unconfig <i>seconds</i>	Number of seconds to wait after receipt of notification that the BFD configuration has been removed by a BFD neighbor, so that any configuration inconsistency between the BFD peers can be fixed. If the BFD configuration issue is not resolved before the specified timer is reached, the BFD session is declared down. The range is 60 to 3600. Note In Cisco IOS XR Releases 4.0 and 4.0.1, the available minimum is 30, but is not recommended.

Command Default

No timers are configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command is supported on bundle interfaces only.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example configures a timer for members of the specified Ethernet bundle that allows up to 1 minute (60 seconds) after startup of a BFD member link session to wait for receipt of the expected notification from the BFD peer to declare the session up:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 timers start 60
```

The following example configures a timer for members of the specified Ethernet bundle that allows up to 1 minute (60 seconds) to wait after receipt of notification that the BFD configuration has been removed by a BFD neighbor, before declaring a BFD session down:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 timers nbr-unconfig 60
```

The following example specifies the same timers for member links of a POS bundle:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-POS 1
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 timers start 30
RP/0/RP0/CPU0:router(config-if)# bfd address-family ipv4 timers nbr-unconfig 60
```

bfd fast-detect

To enable Bidirectional Forwarding Detection (BFD) to detect failures in the path between adjacent forwarding engines, use the **bfd fast-detect** command in the appropriate configuration mode. To return the software to the default state in which BFD is not enabled, use the **no** form of this command.

bfd fast-detect [**disable**| **ipv4**]

no bfd fast-detect

Syntax Description

disable	Disables the detection of failures in the path between adjacent forwarding engines for a specified entity, such as a BGP neighbor or OSPF interface.
Note	The disable keyword is available in the following modes only: BGP configuration, OSPF area configuration, OSPF area interface configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration .
ipv4	Enables Intermediate System-to-Intermediate System (IS-IS) BFD detection of failures in the path between adjacent forwarding engines.
Note	The ipv4 keyword is available in IS-IS router configuration mode only.

Command Default

BFD detection of failures in the path between adjacent forwarding engines is disabled.

Command Modes

Neighbor configuration
 Session group configuration
 Neighbor group configuration
 Interface configuration
 Interface configuration
 Router configuration
 Area configuration
 Area interface configuration
 Router configuration
 Area configuration
 Area interface configuration
 Interface configuration

Command History

Release	Modification
Release 3.2	This command was introduced.

Release	Modification
Release 3.4.0	The bfd fast-detect command was supported in router PIM interface configuration mode.
Release 3.8.0	The bfd fast-detect command was supported in the following modes: OSPFv3 router configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

BFD can support multihop for internal and external BGP peers.

Use the **bfd fast-detect** command to provide protocol- and media-independent, short-duration failure detection of the path between adjacent forwarding engines, including the interfaces and data links.

BFD must be configured on directly connected neighbors for a BFD session to be established between the neighbors.

When MPLS-TE tunnels are protected by backup tunnels, BFD failure triggers fast reroute on affected tunnels.

In OSPF and OSPFv3 environments, the setting of the **bfd fast-detect** command is inherited from the highest-level configuration mode in which the command was configured. From the lowest to the highest configuration modes, the inheritance rules are as follows:

- If you enable BFD in area interface configuration mode, it is enabled on the specified interface only.
- If you enable BFD in area configuration mode, it is enabled on all interfaces in the specified area.
- If you enable BFD in router configuration mode, it is enabled on all areas and all associated interfaces in the specified routing process.

The **disable** keyword is available in the following modes: BGP configuration, OSPF area configuration, OSPF area interface configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration. In OSPF and OSPFv3 environments, the **disable** option enables you to override the inheritance rules described previously. For example, if you enable BFD in an OSPF area, BFD is enabled on all interfaces in that area. If you do not want BFD running on one of the interfaces in that area, you must specify the **bfd fast-detect disable** command for that interface only.

To disable BFD or return the software to the default state in which BFD is not enabled in IS-IS router configuration mode and MPLS-TE configuration mode, you must enter the **no bfd fast-detect** command.

Task ID

Task ID	Operations
bgp	read, write
isis	read, write

Task ID	Operations
mpls-te	read, write
ospf	read, write
multicast	read, write

Examples

The following example shows how to configure BFD on a BGP router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router bgp 65000
RP/0/RP0/CPU0:router(config-bgp)# neighbor 192.168.70.24
RP/0/RP0/CPU0:router(config-bgp-nbr)# remote-as 2
RP/0/RP0/CPU0:router(config-bgp-nbr)# bfd fast-detect
```

The following example shows the configuration of an OSPFv3 routing process named `san_jose`. The example shows two areas, each of which includes Gigabit Ethernet interfaces. In area 0, BFD is enabled at the area level, which means that by virtue of the inheritance rules, BFD is enabled on all interfaces within the area except those on which BFD is explicitly disabled. Given this rule, BFD is enabled on Gigabit Ethernet interfaces 1/0/0/0 and 2/0/0/0 and is disabled on interface 3/0/0/0.

In area 1, BFD is enabled on Gigabit Ethernet interface 5/0/0/0 only. Because BFD is not enabled at the area level nor explicitly enabled on interface 4/0/0/0, it is disabled on this interface.

```
router ospfv3 san_jose
  area 0
    bfd fast-detect
    ...
    int gige 1/0/0/0
    !
    int gige 2/0/0/0
    ...
  int gige 3/0/0/0
    bfd fast-detect disable
  !
  !
  area 1
    int gige 4/0/0/0
    !
    int gige 5/0/0/0
    bfd fast-detect
    !
  !
```

Related Commands

Command	Description
address-family ipv4 unicast (BFD), on page 97	Enables BFD fast-detection on a specific IPV4 unicast destination address prefix and on the forwarding next-hop address.
bfd minimum-interval, on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier, on page 122	Sets the BFD multiplier.
show bfd, on page 146	Displays BFD information for a specific location.

bfd minimum-interval

To specify the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope, use the **bfd minimum-interval** command in the appropriate configuration mode. To return the router to the default setting, use the **no** form of this command.

bfd minimum-interval *milliseconds*

no bfd minimum-interval [*milliseconds*]

Syntax Description

<i>milliseconds</i>	Interval between sending BFD hello packets to the neighbor. The range is 15 to 30000 milliseconds. For MPLS-TE, the range is 15 to 200 milliseconds.

Command Default

BGP *interval*: 50 milliseconds
 IS-IS *interval*: 150 milliseconds
 OSPF and OSPFv3 *interval*: 150 milliseconds
 MPLS-TE *interval*: 15 milliseconds
 PIM *interval*: 150 milliseconds

Command Modes

Router configuration
 Interface configuration
 MPLS TE configuration
 Router configuration
 Area configuration
 Area interface configuration
 Router configuration
 Area configuration
 Area interface configuration
 Interface configuration

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.4.0	The bfd minimum-interval command was supported in router PIM interface configuration mode.

Release	Modification
Release 3.8.0	The bfd minimum-interval command was supported in the following modes: OSPFv3 router configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

In OSPF and OSPFv3 environments, the setting of the **bfd minimum-interval** command is inherited from the highest-level configuration mode in which the command was configured. From the lowest to the highest configuration modes, the inheritance rules are as follows:

- If you configure the minimum interval in area interface configuration mode, the updated interval affects the BFD sessions on the specified interface only.
- If you configure the minimum interval in area configuration mode, the updated interval affects the BFD sessions on all interfaces in the specified area.
- If you configure the minimum interval in router configuration mode, the updated interval affects the BFD sessions in all areas and all associated interfaces in the specified routing process.

If desired, you can override these inheritance rules by explicitly configuring the **bfd minimum-interval** command for a specific area interface or area.



Note

When multiple applications share the same BFD session, the application with the most aggressive timer wins locally. Then, the result is negotiated with the peer router.

Keep the following router-specific rules in mind when configuring the minimum BFD interval:

- The maximum rate in packets-per-second (pps) for BFD sessions is linecard-dependent. If you have multiple linecards supporting BFD, then the maximum rate for BFD sessions per system is the supported linecard rate multiplied by the number of linecards.
 - The maximum rate for BFD sessions per linecard is 7000 pps.
- If a session is running in asynchronous mode without echo, then PPS used for this session is $(1000 / \text{asynchronous interval in milliseconds})$.
- If a session is running in asynchronous mode with echo, then PPS used for this session is $(1000 / \text{echo interval in milliseconds})$.
This is calculated as: $1000 / \text{value of the } \mathbf{bfd\ minimum-interval} \text{ command}$.



Note

The rate for BFD sessions on bundle member links is calculated differently. For more information, see the **bfd address-family ipv4 minimum-interval** command.

- The maximum number of all BFD sessions per linecard is 1024.

- The maximum number of all BFD sessions per linecard is 1440.
- When asynchronous mode is available, the minimum interval must be greater than or equal to 15 milliseconds for up to 100 sessions on the line card. If you are running the maximum of 1024 sessions, the failure detection interval must be greater than or equal to 150 milliseconds.
- When asynchronous mode is available, the minimum interval must be greater than or equal to 250 milliseconds, with a multiplier of 3 for up to 100 sessions per line card
- When asynchronous mode is available, the minimum interval must be greater than or equal to 15 milliseconds for up to 100 sessions on the line card. If you are running the maximum of 1440 sessions, the failure detection interval must be greater than or equal to 150 milliseconds.
- When echo mode is available, the minimum interval must be greater than or equal to 15 milliseconds for up to 100 sessions on the line card. If you are running the maximum of 1024 sessions, the failure detection interval must be less than or equal to 150 milliseconds.
- When echo mode is available, the minimum interval must be 50 milliseconds with a multiplier of 3.
- When echo mode is available, the minimum interval must be greater than or equal to 15 milliseconds for up to 100 sessions on the line card. If you are running the maximum of 1440 sessions, the failure detection interval must be less than or equal to 150 milliseconds.

Task ID

Task ID	Operations
bgp	read, write
isis	read, write
mpls-te	read, write
ospf	read, write
multicast	read, write

Examples

The following example shows how to set the BFD minimum interval for a BGP routing process:

```
RP/0/RP0/CPU0:router(config)# router bgp 6500
RP/0/RP0/CPU0:router(config-bgp)# bfd minimum-interval 275
```

The following example shows the configuration of an OSPFv3 routing process named `san_jose`. The example shows two areas, each of which includes Gigabit Ethernet interfaces. In area 0, the minimum interval is set to 200 at the area level, which means that by virtue of the inheritance rules, the same value is set on all interfaces within the area except those on which a different value is explicitly configured. Given this rule, Gigabit Ethernet interface 1/0/0/0 uses the interval of 200, which is inherited from the area, while interface 2/0/0/0 uses the explicitly configured value of 300.

In area 1, the minimum interval is not configured at the area or interface levels, which means that interfaces 3/0/0/0 and 4/0/0/0 use the default interval of 150.

```
router ospfv3 san_jose
bfd fast-detect
  area 0
```

```
bfd minimum-interval 200
int gige 1/0/0/0
!
int gige 2/0/0/0
bfd minimum-interval 300
!
!
area 1
int gige 3/0/0/0
!
int gige 4/0/0/0
!
!
```

Related Commands

Command	Description
address-family ipv4 unicast (BFD), on page 97	Enables BFD fast-detection on a specific IPV4 unicast destination address prefix and on the forwarding next-hop address.
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
bfd multiplier, on page 122	Sets the BFD multiplier.
show bfd, on page 146	Displays BFD information for a specific location.

bfd multipath include location

To include specific linecards to host BFD multiple path sessions, use the **bfd multipath include location** command in the global configuration mode. To remove the configuration, use the **no** form of this command.

bfd multipath include location *node-id*

no bfd multipath include location *node-id*

Syntax Description

location <i>node-id</i>	Configures BFD multipath on the specified location. The <i>node-id</i> variable is mentioned in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 4.2.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

This example shows how to run the **bfd multipath include location** command on a specific location:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd multipath include location 0/5/CPU0
```

Related Commands

Command	Description
bfd, on page 99	Enters BFD configuration mode.
show bfd multipath, on page 157	Displays information regarding BFD multipath sessions.

bfd multiplier

To set the Bidirectional Forwarding Detection (BFD) multiplier, use the **bfd multiplier** command in the appropriate configuration mode. To return the router to the default setting, use the **no** form of this command.

bfd multiplier *multiplier*

no bfd multiplier [*multiplier*]

Syntax Description

<i>multiplier</i>	Number of times a packet is missed before BFD declares the neighbor down. The ranges are as follows:
	• BGP—2 to 16 • IS-IS—2 to 50 • MPLS-TE—2 to 10 • OSPF and OSPFv3—2 to 50 • PIM—2 to 50

Command Default

The default multiplier is 3.

Command Modes

Router configuration
 Interface configuration
 MPLS-TE configuration
 Router configuration
 Area configuration
 Area interface configuration
 Router configuration
 Area configuration
 Area interface configuration
 Interface configuration

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.4.0	The bfd multiplier command was supported in router PIM interface configuration mode.

Release	Modification
Release 3.8.0	The bfd multiplier command was supported in the following modes: OSPFv3 router configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

In OSPF and OSPFv3 environments, the setting of the **bfd multiplier** command is inherited from the highest-level configuration mode in which the command was configured. From the lowest to the highest configuration modes, the inheritance rules are as follows:

- If you configure a multiplier in area interface configuration mode, the updated multiplier affects the BFD sessions on the specified interface only.
- If you configure a multiplier in area configuration mode, the updated multiplier affects the BFD sessions on all interfaces in the specified area.
- If you configure a multiplier in router configuration mode, the updated multiplier affects the BFD sessions in all areas and all associated interfaces in the specified routing process.

If desired, you can override these inheritance rules by explicitly configuring the **bfd multiplier** command for a specific area interface or area.

If the multiplier is changed using the **bfd multiplier** command, the new value is used to update all existing BFD sessions for the protocol (BGP, IS-IS, MPLS-TE, OSPF, or OSPFv3) .

Task ID

Task ID	Operations
bgp	read, write
isis	read, write
mpls-te	read, write
ospf	read, write
multicast	read, write

Examples

The following example shows how to set the BFD multiplier in a BGP routing process:

```
RP/0/RP0/CPU0:router(config)# router bgp 65000
RP/0/RP0/CPU0:router(config-bgp)# bfd multiplier 2
```

The following example shows the configuration of an OSPFv3 routing process named san_jose. The example shows two areas, each of which includes Gigabit Ethernet interfaces. In area 0, the multiplier is set to 5 at the area level, which means that by virtue of the inheritance rules, the same value is set on all interfaces within

the area except those on which a different value is explicitly configured. Given this rule, Gigabit Ethernet interface 1/0/0/0 uses a multiplier of 5, which is inherited from the area, while interface 2/0/0/0 uses the explicitly configured multiplier of 2.

In area 1, a multiplier is not configured at the area or interface levels, which means that interfaces 3/0/0/0 and 4/0/0/0 use the default value of 3.

```
router ospfv3 san_jose
bfd fast-detect
  area 0
bfd multiplier 5
int gige 1/0/0/0
!
int gige 2/0/0/0
bfd multiplier 2
!
!
  area 1
int gige 3/0/0/0
!
int gige 4/0/0/0
!
!
```

Related Commands

Command	Description
address-family ipv4 unicast (BFD), on page 97	Enables BFD fast-detection on a specific IPV4 unicast destination address prefix and on the forwarding next-hop address.
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
bfd minimum-interval, on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
show bfd, on page 146	Displays BFD information for a specific location.

clear bfd counters

To clear Bidirectional Forwarding Detection (BFD) counters, use the **clear bfd counters** command in EXEC mode.

clear bfd counters {**ipv4**| [**singlehop**| **multihop**]} [**ipv6**| [**singlehop**| **multihop**]] **all** [**label**] [**packet**] [**timing**]
[**interface** *type interface-path-id*] **location** *node-id*

Syntax Description

ipv4	(Optional) Clears BFD over IPv4 information only.
ipv6	(Optional) Clears BFD over IPv6 information only.
singlehop	(Optional) Clears BFD singlehop information only.
multihop	(Optional) Clears BFD multihop information only.
all	(Optional) Clears both BFD over IPv4 and BFD over IPv6 information.
packet	(Optional) Specifies that packet counters are cleared.
timing	(Optional) Specifies that timing counters are cleared.
interface	(Optional) Specifies the interface from which the BFD packet counters are cleared.
<i>type</i>	Specifies the interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>node-id</i>	Clears BFD counters from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.0	The ipv4 , ipv6 , and all keywords were added.
Release 4.2.0	Support for the singlehop and multihop keywords were added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Both IPv4 and IPv6 BFD sessions can run simultaneously on the same line card.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

The following example shows how to clear the BFD IPv6 packet counters on a POS interface:

```
RP/0/RP0/CPU0:router# clear bfd counters packet ipv6 interface POS 0/1/0/0 location 0/1/cpu0
```

The following example shows how to clear the BFD IPv4 timing counters:

```
RP/0/RP0/CPU0:router# clear bfd counters ipv4 timing location 0/5/cpu0
```

Related Commands

Command	Description
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
bfd minimum-interval, on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier, on page 122	Sets the BFD multiplier.
show bfd, on page 146	Displays BFD information for a specific location.

dampening (BFD)

To specify delays for BFD session startup, use the **dampening** command in Bidirectional Forwarding Detection (BFD) configuration mode. To return to the default, use the **no** form of this command.

dampening [**bundle-member**] {**initial-wait**| **maximum-wait**| **secondary-wait**} *milliseconds*

no dampening [**bundle-member**] {**initial-wait**| **maximum-wait**| **secondary-wait**} *milliseconds*

Syntax Description

bundle-member	(Optional) Specifies initial, maximum, or secondary delays in milliseconds for BFD session startup on BFD bundle members.
initial-wait	Specifies the initial delay in milliseconds before starting a BFD session. For bundle members, the default is 16000. For non-bundle interfaces, the default is 2000.
maximum-wait	Specifies the maximum delay in milliseconds before starting a BFD session. For bundle members, the default is 600000. For non-bundle interfaces, the default is 12000. Note The maximum delay must be greater than the initial delay.
secondary-wait	Specifies a secondary delay in milliseconds before starting a BFD session. For bundle members, the default is 20000. For non-bundle interfaces, the default is 5000.
<i>milliseconds</i>	Number from 1 to 3600000.

Command Default

BFD session startup delays are not configured and the default timer is indefinite.

Command Modes

BFD configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The bundle-member keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

You do not have to configure the BFD startup timers. If you do configure the initial wait startup timer (using the **initial-wait** keyword), then it must be less than the value of the maximum wait timer.

By default, BFD dampening is applied to all sessions in the following manner:

- If a session is brought down, then dampening is applied before a session is allowed to transition to initial/up states.
- Length of time a session is dampened grows exponentially with continuous session flap.
- If a session remains up for minimum two minutes, then the length of time a session dampens with the next session flap is reset to the initial dampening value.

BFD on bundle member applies dampening, only if the detected failure is specific to layer 3. BFD dampening is not invoked for L1 or L2 failures. BFD is started after Layer 1 and Layer 2 (LACP) is up to prevent a race condition and false triggers. BFD is notified to stop/ignore when L1 or L2 goes down and must be notified to start/resume when L1 or L2 recovers for a given/affected link/member.

BFD applies dampening till the session transitions from up to down state and the session is not removed. Whenever there is a failure detected at L1 or L2, the bundle manager removes BFD session on a member.

When dampening is removed a syslog message 'Exponential backoff dampening for BFD session has been cleared for specified BFD session. When/if same session gets created by application(s), only calculated initial wait time will be applied' is generated. If this is the desired behavior, then dampening can be enabled by configuring the BFD configuration, by using the command **bfd dampening bundle-member l3-failure-only**.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

The following example shows how to configure an initial and maximum delay for BFD session startup on BFD bundle members:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# dampening bundle-member initial-wait 8000
RP/0/RP0/CPU0:router(config-bfd)# dampening bundle-member maximum-wait 15000
```

The following example shows how to change the default initial-wait for BFD on a non-bundle interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# dampening initial-wait 30000
RP/0/RP0/CPU0:router(config-bfd)# dampening maximum-wait 35000
```

dampening (BFD)

Related Commands

Command	Description
bfd, on page 99	Enters BFD configuration mode.

echo disable

To disable echo mode on a router or on an individual interface or bundle, use the **echo disable** command in Bidirectional Forwarding Detection (BFD) configuration mode. To return the router to the default configuration where echo mode is enabled, use the **no** form of this command.

echo disable

no echo disable

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes BFD configuration
BFD interface configuration

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you are using BFD with Unicast Reverse Path Forwarding (uRPF), you need to use the **echo disable** command to disable echo mode; otherwise, echo packets are rejected.



Note To enable or disable IPv4 uRPF checking on an IPv4 interface, use the **[no] ipv4 verify unicast source reachable-via** command in interface configuration mode. To enable or disable loose IPv6 uRPF checking on an IPv6 interface, use the **[no] ipv6 verify unicast source reachable-via any** command in interface configuration mode.

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write

Task ID	Operations
mpls-te	read, write

Examples

The following example shows how to disable echo mode on a router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# echo disable
```

The following example shows how to disable echo mode on an individual interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-bfd-if)# echo disable
```

Related Commands

Command	Description
bfd , on page 99	Enters BFD configuration mode.
interface (BFD) , on page 139	Enters BFD interface configuration mode.
ipv4 verify unicast source reachable-via	Enables and disables IPv4 uRPF checking on an IPv4 interface.
ipv6 verify unicast source reachable-via any	Enables and disables loose IPv6 uRPF checking on an IPv6 interface.
show bfd , on page 146	Displays BFD information.

echo ipv4 source

To specify the IP address that you want to use as the source address for BFD echo packets, use the **echo ipv4 source** command in BFD or BFD interface configuration mode. To return to the default, use the **no** form of this command.

echo ipv4 source *ip-address*

no echo ipv4 source *ip-address*

Syntax Description

<i>ip-address</i>	32-bit IPv4 address in dotted-decimal format (A.B.C.D).

Command Default

The IP address of the output interface, or the IP address in the **router-id** command (if configured), is the default address used for an echo packet when the **echo ipv4 source** command is not configured.

Command Modes

BFD configuration
BFD interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you do not configure the IPv4 source address for echo packets, then BFD uses the IP address of the output interface or the address in the **router-id** command if specified.

You can override the default address for BFD echo packets by specifying an IPv4 source address for echo packets globally for all BFD sessions on the router and at an individual interface. Specifying the IP address at an individual interface will override any value specified globally for BFD on the router.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

The following example shows how to specify the IP address 10.10.10.1 as the source address for BFD echo packets for all BFD sessions on the router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# echo ipv4 source 10.10.10.1
```

The following example shows how to specify the IP address 10.10.10.1 as the source address for BFD echo packets on an individual Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-bfd-if)# echo ipv4 source 10.10.10.1
```

The following example shows how to specify the IP address 10.10.10.1 as the source address for BFD echo packets on an individual Packet-over-SONET (POS) interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-bfd-if)# echo ipv4 source 10.10.10.1
```

Related Commands

Command	Description
bfd , on page 99	Enters BFD configuration mode.
echo disable , on page 131	Disables echo mode on a router or on an individual interface or bundle.

echo latency detect

To enable latency detection for BFD echo packets, use the **echo latency detect** command in BFD configuration mode. To return to the default, use the **no** form of this command.

echo latency detect [**percentage** *percent-value* [**count** *packet-count*]]

no echo latency detect [**percentage** *percent-value* [**count** *packet-count*]]

Syntax Description

percentage <i>percent-value</i>	(Optional) Percentage of the echo failure detection time to be detected as bad latency. The range is 100 to 250. The default is 100.
count <i>packet-count</i>	(Optional) Number of consecutive packets received with the detected bad latency that will take down a BFD session. The range is 1 to 10. The default is 1.

Command Default

Echo latency detection is disabled.

Command Modes

BFD configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

Latency detection is only valid where echo mode is supported for BFD. However, it is not supported on bundle interfaces.

Without latency detection, standard BFD echo failure detection tracks only the absence of receipt of echo packets within a period of time based on a counter. However, this standard echo failure detection does not address latency between transmission and receipt of any specific echo packet, which can build beyond desired tolerances over the course of the BFD session.

When latency detection is enabled, a percentage is multiplied to the echo failure detection value ($I \times M \times \%$), and the roundtrip delay is computed for the echo packet. If this delay is greater than ($I \times M \times \%$), then the BFD session is taken down.

If you have specified a packet count, then the system tracks the number of packets received back-to-back with bad latency before taking down the session.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

In the following examples, consider that the BFD minimum interval is 50 ms, and the multiplier is 3 for the BFD session.

The following example shows how to enable echo latency detection using the default values of 100% of the echo failure period (I x M) for a packet count of 1. In this example, when one echo packet is detected with a roundtrip delay greater than 150 ms, the session is taken down:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# echo latency detect
```

The following example shows how to enable echo latency detection based on 200% (two times) of the echo failure period for a packet count of 1. In this example, when one packet is detected with a roundtrip delay greater than 300 ms, the session is taken down:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# echo latency detect percentage 200
```

The following example shows how to enable echo latency detection based on 100% of the echo failure period for a packet count of 3. In this example, when three consecutive echo packets are detected with a roundtrip delay greater than 150 ms, the session is taken down:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# echo latency detect percentage 100 count 3
```

Related Commands

Command	Description
bfd , on page 99	Enters BFD configuration mode.
bfd minimum-interval , on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier , on page 122	Sets the BFD multiplier.
echo startup validate , on page 137	Enables verification of the echo packet path before starting a BFD session.

echo startup validate

To enable verification of the echo packet path before starting a BFD session, use the **echo startup validate** command in BFD configuration mode. To return to the default, use the **no** form of this command.

echo startup [force]

no echo startup [force]

Syntax Description

force	(Optional) Ignores the remote 'Required Min Echo RX Interval' setting.

Command Default

Echo startup validation is disabled.

Command Modes

BFD configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

Echo validation is only valid where echo mode is supported for BFD. However, it is not supported on bundle interfaces.

When a BFD session is down and the **echo startup validate** command is configured, an echo packet is periodically transmitted on the link while it is down to verify successful transmission within the configured latency before allowing the BFD session to change state.

Without the **force** option, the echo validation test only runs if the last received control packet contains a non-zero “Required Min Echo RX Interval” value. When the **force** keyword is configured, the echo validation test runs regardless of this value.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write

Task ID	Operations
isis	read, write
mpls-te	read, write

Examples

The following example shows how to enable echo startup validation for BFD sessions on non-bundle interfaces if the last received control packet contains a non-zero “Required Min Echo RX Interval” value:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# echo startup validate
```

The following example shows how to enable echo startup validation for BFD sessions on non-bundle interfaces regardless of the “Required Min Echo RX Interval” value in the last control packet:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# echo startup validate force
```

Related Commands

Command	Description
bfd , on page 99	Enters BFD configuration mode.
echo latency detect , on page 135	Enables latency detection for BFD echo packets.

interface (BFD)

To enter Bidirectional Forwarding Detection (BFD) interface configuration mode, where you can disable echo mode on an interface, use the **interface** command in BFD configuration mode. To return to BFD configuration mode, use the **no** form of this command.

interface *type interface-path-id*

no interface *type interface-path-id*

Syntax Description

<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

BFD configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

If you are using BFD with Unicast Reverse Path Forwarding (uRPF) on a particular interface, then you need to use the **echo disable** command in BFD interface configuration mode to disable echo mode on that interface; otherwise, echo packets are rejected by the interface.

**Note**

To enable or disable IPv4 uRPF checking on an IPv4 interface, use the **[no] ipv4 verify unicast source reachable-via** command in interface configuration mode. To enable or disable loose IPv6 uRPF checking on an IPv6 interface, use the **[no] ipv6 verify unicast source reachable-via any** command in interface configuration mode.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

The following example shows how to enter BFD interface configuration mode for a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-bfd-if)#
```

The following example shows how to enter BFD interface configuration mode for a Packet-over-SONET/SDH (POS) interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-bfd-if)#
```

Related Commands

Command	Description
bfd , on page 99	Enters BFD configuration mode.
echo disable , on page 131	Disables echo mode on an individual interface or on the entire router.
ipv4 verify unicast source reachable-via	Enables and disables IPv4 uRPF checking on an IPv4 interface.
ipv6 verify unicast source reachable-via any	Enables and disables loose IPv6 uRPF checking on an IPv6 interface.

Command	Description
show bfd , on page 146	Displays BFD information.

ipv6 checksum

To enable and disable IPv6 checksum calculations on BFD UDP packets globally or on a BFD interface, use the **ipv6 checksum** command in Bidirectional Forwarding Detection (BFD) or BFD interface configuration mode. To return to the default, use the **no** form of this command.

BFD Configuration

ipv6 checksum disable

no ipv6 checksum disable

BFD Interface Configuration

ipv6 checksum [disable]

no ipv6 checksum [disable]

Syntax Description

disable	(Optional for BFD interface configuration only) Disables IPv6 checksum calculations.

Command Default

IPv6 checksum calculations on BFD UDP packets is disabled.

Command Modes

BFD configuration

BFD interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

IPv6 checksum calculations for UDP packets are disabled by default for BFD sessions. You can enable IPv6 checksum support either globally for all BFD sessions, or on an individual interface.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write

Task ID	Operations
isis	read, write
mpls-te	read, write

Examples

The following example shows how to enable IPv6 checksum calculations for UDP packets for all BFD sessions on the router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# no ipv6 checksum disable
```

The following example shows how to disable IPv6 checksum calculations for UDP packets for all BFD sessions on the router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# ipv6 checksum disable
```

The following example shows how to enable echo mode for BFD sessions on an individual interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-bfd-if)# ipv6 checksum
```

The following example shows how to disable echo mode for BFD sessions on an individual interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# bfd
RP/0/RP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-bfd-if)# ipv6 checksum disable
```

Related Commands

Command	Description
bfd , on page 99	Enters BFD configuration mode.
interface (BFD) , on page 139	Enters BFD interface configuration mode, where you can disable echo mode on an interface.
show bfd , on page 146	Displays BFD information for a specific location.

multihop ttl-drop-threshold

To specify the maximum time to live (TTL) value for multihop sessions per system, use the **multihop ttl-drop-threshold** command in the BFD configuration mode. To return to the default, use the **no** form of this command.

multihop ttl-drop-threshold *value*

no multihop ttl-drop-threshold *value*

Syntax Description

<i>value</i>	Specifies the configurable range of values for TTL. It ranges from 0 to 254.

Command Default

No default behavior or values

Command Modes

BFD configuration

Command History

Release	Modification
Release 4.2.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

This configuration command is only applicable for BFD multihop sessions.

Task ID

Task ID	Operation
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

This example shows how to set the maximum ttl value as 2 using the **multihop-ttl-drop-threshold** command:

```
RP/0/RP0/CPU0:router#configure
RP/0/RP0/CPU0:router#bfd multihop ttl-drop threshold 2
```

Related Commands

Command	Description
show bfd counters, on page 151	Displays BFD counter information.
show bfd multipath, on page 157	Displays information regarding BFD multipath sessions.

show bfd

To display Bidirectional Forwarding Detection (BFD) information for a specific location, use the **show bfd** command in EXEC mode.

show bfd [**ipv4**| **singlehop**| **multihop**]| **ipv6** [**singlehop**| **multihop**]| **all**[**label**]**interface**[**destination**| **source**] [**location** *node-id*]

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
multihop	(Optional) Displays BFD multihop information only.
singlehop	(Optional) Displays BFD singlehop information only.
ipv6	(Optional) Displays BFD over IPv6 information only.
multihop	(Optional) Displays BFD multihop information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
label	(Optional) Displays the BFD label information.
interface	Specifies the BFD interface.
destination	(Optional) Specifies the destination IPv4 unicast address.
source	(Optional) Specifies the source IPv4 unicast address.
location <i>node-id</i>	Displays BFD information for the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.0	The ipv6 keyword was added.
Release 4.2.0	Support for multihop keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
bgp	read
ospf	read
isis	read
mpls-te	read

Examples

The following example shows the output from the **show bfd** command:

```
RP/0/RP0/CPU0:router# show bfd
IPv4 Sessions Up: 0, Down: 0, Total: 0
```

The following example shows the output from the **show bfd all** command:

```
RP/0/RP0/CPU0:router# show bfd all
IPv4:
-----
IPv4 Sessions Up: 20, Down: 0, Unknown/Retry: 2, Total: 22
IPv6:
-----
IPv6 Sessions Up: 128, Down: 2, Unknown/Retry: 1, Total: 131
Label:
-----
Label Sessions Up: 10, Down: 0, Unknown/Retry: 1, Total: 11
```

The following example shows the output from the **show bfd ipv4** command:

```
RP/0/RP0/CPU0:router# show bfd ipv4
IPv4 Sessions Up: 0, Down: 0, Total: 0
```

The following example shows the output from the **show bfd ipv6** command:

```
RP/0/RP0/CPU0:router# show bfd ipv6
IPv6 Sessions Up: 0, Down: 0, Total: 0
```

The following example shows the output from the **show bfd ipv4 location** command:

```
RP/0/RP0/CPU0:router# show bfd ipv4 location 0/3/cpu0
IPv4 Sessions Up: 0, Down: 1, Standby: 0, Total: 1
```

Related Commands

Command	Description
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
bfd minimum-interval, on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier, on page 122	Sets the BFD multiplier.

show bfd client

To display Bidirectional Forwarding Detection (BFD) client information, use the **show bfd client** command in EXEC mode.

show bfd client [detail]

Syntax Description

detail	(Optional) Specifies detailed client information including number of sessions and client reconnects.

Command Default

Enter the **show bfd client** command without specifying the **detail** keyword to display summarized BFD client information.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
bgp	read
ospf	read
isis	read
mpls-te	read

Examples

The following example shows the output from the **show bfd client** command:

```
RP/0/RP0/CPU0:router# show bfd client
Name           Node           Num sessions
-----
```

show bfd client

```

bgp          0/RP0/CPU0 0
isis         0/RP0/CPU0 0
isis         0/RP0/CPU0 0

```

Table 11: show bfd client Field Descriptions

Field	Description
Name	Name of the BFD client.
Node	Location of the BFD client.
Num sessions	Number of active sessions for the BFD client.

Related Commands

Command	Description
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
bfd minimum-interval, on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier, on page 122	Sets the BFD multiplier.
show bfd, on page 146	Displays BFD information for a specific location.

show bfd counters

To display Bidirectional Forwarding Detection (BFD) counter information, use the **show bfd counters** command in EXEC mode.

show bfd counters [**ipv4**] [**singlehop** | **multihop**][**ipv6** [**singlehop** | **multihop**]] **all** [**label**] **packet** [**interface** *type interface-path-id*] **location** *node-id*

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
ipv6	(Optional) Displays BFD over IPv6 information only.
singlehop	(Optional) Displays BFD singlehop information only.
multihop	(Optional) Displays BFD multihop information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
packet	Specifies that packet counters are displayed.
interface	(Optional) Specifies the interface for which to show counters.
<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>node-id</i>	Displays BFD counters from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.0	The ipv4 , ipv6 , and all keywords were added.

Release	Modification
Release 4.2.0	Support for the singlehop and multihop keywords were added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
bgp	read
ospf	read
isis	read
mpls-te	read

Examples

The following example shows the output from the **show bfd counters packet** command for both IPv4 and IPv6:

```
RP/0/RP0/CPU0:router# show bfd counters packet all interface POS 0/1/0/0 location 0/1/cpu0
```

```
Mon Nov  5 08:49:51.950 UTC
```

```
IPv4:
```

```
-----
```

```
POS 0/1/0/0          Recv      Xmit      Echo:      Recv      Xmit
  Async:             520        515          9400      9400
```

```
IPv6:
```

```
-----
```

```
POS 0/1/0/0          Recv      Xmit      Echo:      Recv      Xmit
  Async:             237        237           0         0
```

The following example shows the output from the **show bfd counters packet** command for IPv4:

```
RP/0/RP0/CPU0:router# show bfd counters ipv4 packet
```

```
IPv4 Singlehop:
GigabitEthernet0/0/1/2          Recv      Xmit
  Async:                       4148      4137      Echo: (    47136)    80192
GigabitEthernet0/1/1/2          Recv      Xmit
  Async:                       116876     125756      Echo: (  2268192)  2301312
Bundle-Ether10                  Recv      Xmit
  Async:                        2           0      Echo:              0           0
Bundle-Ether20                  Recv      Xmit
  Async:                       91           0      Echo:              0           0

IPv4 Multihop: (Src IP/Dst IP/Vrf Id)
33.15.151.4/33.16.151.4/0x12345678  Recv      Xmit
  Async:                        0           570337
```

Table 12: show bfd counters packet Field Descriptions

Field	Description
Async	Number of asynchronous mode (control) packets that were received or transmitted on the specified interface.
Echo	Number of echo packets that were received or transmitted on the specified interface.

Related Commands

Command	Description
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
bfd minimum-interval, on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier, on page 122	Sets the BFD multiplier.

show bfd mib session

To display IPv4 and IPv6 Bidirectional Forwarding Detection (BFD) MIB session information, use the **show bfd mib session** command in EXEC mode.

show bfd mib session [*location node-id*]

Syntax Description

location <i>node-id</i>	(Optional) Displays all IPv4 and IPv6 BFD MIB session information stored on the specified node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

When *node-id* is not specified, information for all IPv4 and IPv6 BFD MIB sessions, stored on the route processor node, is displayed.

Command Modes

EXEC

Command History

Release	Modification
Release 3.8.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When *node-id* is not specified, information for all IPv4 and IPv6 BFD MIB sessions, stored on the route processor node, is displayed, and this information is populated and updated only after SNMP operations for those BFD MIB sessions are performed.

When *node-id* is specified, information for all IPv4 and IPv6 BFD MIB sessions, stored on the specified node (linecard), is displayed, and this information is updated automatically without SNMP operations being performed.

Task ID

Task ID	Operations
bgp	read
ospf	read
isis	read
mpls-te	read

Examples

The following example displays all IPv4 and IPv6 BFD MIB session information stored on the RP node:

```
RP/0/RP0/CPU0:router# show bfd mib session

Tue Sep  9 07:49:30.828 PST DST
Local Discr: 327681(0x50001), Remote Discr: 0(0x0)
BFD session: GigabitEthernet0_1_5_2(0x11800c0), 10.27.4.7
  Current State: ADMIN DOWN, Number of Times UP: 0
  Running Version: 0, Last Down Diag: None
  Last Up Time (s.ns): 0.0
  Last Down Time (s.ns): 0.0
  Detection Multiplier: 0
  Desired Min TX Interval: 0
  Required Min RX Interval: 0
  Required Min RX Echo Interval: 0
  Packets in/out: 0/0
  Current Trap Bitmap: 0x0
  Last Time Cached: Not yet cached
```

The following example displays all IPv4 and IPv6 BFD MIB session information stored on 0/1/CPU0:

```
RP/0/RP0/CPU0:router# show bfd mib session location 0/1/CPU0

Tue Sep  9 07:44:49.190 PST DST
Local Discr: 327681(0x50001), Remote Discr: 0(0x0)
BFD session: GigabitEthernet0_1_5_2(0x11800c0), 10.27.4.7
  Number of times UP: 0
  Last Down Diag: None
  Last Up Time (s.ns): 0.0
  Last Down Time (s.ns): 0.0
  Packets in/out: 0/1140134
```

Table 13: show bfd mib Field Descriptions

Field	Description
date and timestamp	Date and time stamp during which a snapshot of the BFD MIB session information is taken.
Local Discr	Local discriminator (in decimal and hexadecimal) that uniquely identifies the BFD MIB session.
Remote Discr	Session discriminator (in decimal and hexadecimal) that was chosen by the remote system for the BFD MIB session.
BFD session	Index of interface upon which the BFD MIB session is running. Also, neighboring IP address that is monitored with the BFD MIB session.
Current State	Current state of the BFD MIB session.
Number of Times UP	Number of times the BFD MIB session has gone into the up state since the router was last rebooted.

Field	Description
Running Version	BFD protocol version number in which the BFD MIB session is running.
Last Down Diag	Diagnostic value associated with the last time the BFD MIB session went down.
Last Up Time (s.ns)	Value of sysUpTime, in <i>seconds.nanoseconds</i> , during which the BFD MIB session last came up. If such an event does not exist, a zero is displayed.
Last Down Time (s.ns)	Value of sysUpTime, in <i>seconds.nanoseconds</i> , during which communication was last lost with the neighbor. If such an event does not exist, a zero is displayed.
Detection Multiplier	Failure detection multiplier.
Desired Min TX Interval	Minimum interval, in microseconds, preferred by the local system when transmitting BFD control packets.
Required Min RX Interval	Minimum interval, in microseconds, that the local system supports between received BFD control packets.
Required Min RX Echo Interval	Minimum interval, in microseconds, that the local system supports between received BFD echo packets.
Packets in/out	Total number of BFD messages received and transmitted for the BFD MIB session.
Current Trap Bitmap	Bits that control the trap for the BFD MIB session. A nonzero value indicates that the trap is generated when the next trap event is triggered.
Last Time Cached	When information for the BFD MIB session was last cached. Typically, the information is cached when SNMP operations for the BFD MIB session are performed.

Related Commands

Command	Description
show bfd session, on page 159	

show bfd multipath

To display information concerning only BFD multipath sessions, use the **show bfd multipath** command in the EXEC mode.

show bfd multipath {**ipv4**| **ipv6**| **label**| **all**} **location** *node-id*

Syntax Description

ipv4	Displays BFD over IPv4 information only.
ipv6	Displays BFD over IPv6 information only.
label	Displays BFD label information.
all	Displays both BFD over IPv4 and BFD over IPv6 information.
location <i>node-id</i>	Displays BFD counters from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.2.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
bgp	read
ospf	read
isis	read
mpls-te	read

Examples

This example shows the sample output for **show bfd multipath** command:

RP/0/RP0/CPU0:router#show bfd multipath location 0/5/cpu0

Int/Src Addr	Label/Dest Addr	VRF ID	Discr	Node	State
pw-ether 1	10.10.10.10	0x00000002	0x4	0/5/CPU0	DOWN
tunnel-ip 1	1.1.1.1	0x8	0x5	0/5/CPU0	UP

show bfd session

To display Bidirectional Forwarding Detection (BFD) session information, use the **show bfd session** command in EXEC mode.

show bfd [**ipv4**] [**singlehop** | **multihop**]| **ipv6** [**singlehop** | **multihop**]| **all** | **label**] **session** [**interface** *type* *interface-path-id* [**destination** *ip-address*] [**detail**][**in-label**]] **location** *node-id*

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
ipv6	(Optional) Displays BFD over IPv6 information only.
singlehop	(Optional) Displays BFD singlehop information only.
multihop	(Optional) Displays BFD multihop information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
label	(Optional) Displays the MPLS Transport Profile (MPLS-TP) label BFD information only.
interface	(Optional) Specifies the interface for which to show information.
<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
destination <i>ip-address</i>	(Optional) Displays the BFD session destined for the specified IP address.
detail	(Optional) Displays detailed session information, including statistics and number of state transitions.
in-label	(Optional) Displays the BFD session with a specific incoming MPLS-TP label.
location <i>node-id</i>	(Optional) Displays BFD sessions hosted from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes

EXEC

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.0	The ipv4 , ipv6 , and all keywords were added.
Release 4.2.0	Support for the singlehop and multihop keywords were added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

**Note**

Only VRF ID is displayed in the summary CLI (such as **show bfd multiple-path**, **show bfd all session**, **show bfd counters**) and VRF name and VRF ID is displayed in the detailed CLI (such as **show bfd all session detail**, **show bfd all session status**).

Task ID

Task ID	Operations
bgp	read
ospf	read
isis	read
mpls-te	read

Examples

The following example shows the output from the **show bfd session** command with the **detail** keyword and IPv4 as the default:

```
RP/0/RP0/CPU0:router# show bfd session detail

I/f:TenGigE0/2/0/0.6, Location:0/2/CPU0, dest:10.0.6.2, src:10.0.6.1
  State:UP for 0d:0h:3m:4s, number of times UP:1
Received parameters:
  Version:1, desired tx interval:2 s, required rx interval:2 s
  Required echo rx interval:1 ms, multiplier:3, diag:None
  My discr:589830, your discr:590028, state UP, D/F/P/C/A:0/0/0/1/0
Transmitted parameters:
  Version:1, desired tx interval:2 s, required rx interval:2 s
  Required echo rx interval:1 ms, multiplier:3, diag:None
  My discr:590028, your discr:589830, state UP, D/F/P/C/A:0/0/0/1/0
Timer Values:
  Local negotiated async tx interval:2 s
  Remote negotiated async tx interval:2 s
  Desired echo tx interval:250 ms, local negotiated echo tx interval:250 ms
  Echo detection time:750 ms(250 ms*3), async detection time:6 s(2 s*3)
Local Stats:
  Intervals between async packets:
    Tx:Number of intervals=100, min=952 ms, max=2001 ms, avg=1835 ms
      Last packet transmitted 606 ms ago
    Rx:Number of intervals=100, min=1665 ms, max=2001 ms, avg=1828 ms
      Last packet received 1302 ms ago
  Intervals between echo packets:
    Tx:Number of intervals=100, min=250 ms, max=252 ms, avg=250 ms
      Last packet transmitted 188 ms ago
    Rx:Number of intervals=100, min=250 ms, max=252 ms, avg=250 ms
      Last packet received 187 ms ago
  Latency of echo packets (time between tx and rx):
    Number of packets:100, min=1 ms, max=2 ms, avg=1 ms
Session owner information:
  Client          Desired interval      Multiplier
  -----
  bgp-            250 ms                      3
```

The following example shows the output from the **show bfd session** command with the **all** keyword, which displays both IPv4 and IPv6 information:

```
RP/0/RP0/CPU0:router# show bfd all session location 0/1/CPU0

Mon Nov  5 08:51:50.339 UTC
IPv4:
-----
Interface          Dest Addr          Local det time(int*mult)      State
                   Echo              Async
-----
PO0/1/0/0          10.0.0.2           300ms(100ms*3)              6s(2s*3)              UP

IPv6:
-----
Interface          Dest Addr          Local det time(int*mult)      State
                   Echo              Async
-----
PO0/1/0/0          abcd::2            0s(0s*0)                    15s(5s*3)              UP
```

Table 14: show bfd session detail command Field Descriptions

Field	Description
I/f	Interface type.
Location	Location of the node that hosts the local endpoint of the connection, in the <i>rack/slot/module</i> notation
dest	IP address of the destination endpoint.
src	IP address of the source endpoint.
State	Current state of the connection, and the number of days, hours, minutes, and seconds that this connection has been active.
number of times UP	Number of times this connection has been brought up.
Received parameters	Provides information on the last transmitted control packet for the session: • Version—Version number of the BFD protocol. • desired tx interval—Desired transmit interval. • required rx interval—Required receive interval. • Required echo rx interval—Required echo receive interval. • multiplier— Number of times a packets is missed before BFD declares the neighbor down. • diag—diagnostic code specifying the peer system's reason for the last transition of the session from Up to some other state. • My discr—unique, nonzero discriminator value generated by the transmitting system, used to demultiplex multiple BFD sessions between the same pair of systems. • your discr— discriminator received from the corresponding remote system. This field reflects back the received value of My discr, or is zero if that value is unknown.

Field	Description
Transmitted parameters	Provides information on the last transmitted control packet for the session: • Version—Version number of the BFD protocol. • desired tx interval—Desired transmit interval. • required rx interval—Required receive interval • Required echo rx interval—Required echo receive interval • multiplierNumber of times a packets is missed before BFD declares the neighbor down. • diag—diagnostic code specifying the local system's reason for the last transition of the session from Up to some other state. • My discr—unique, nonzero discriminator value generated by the transmitting system, used to demultiplex multiple BFD sessions between the same pair of systems. • your discr— discriminator received from the corresponding remote system. This field reflects back the received value of My discr, or is zero if that value is unknown.

Field	Description
Timer Values	Provides information on the timer values used by the local and remote ends, as follows: • Local negotiated async tx interval—interval at which control packets are being transmitted by the local end. • Remote negotiated async tx interval—interval at which control packets should be transmitted by the remote end. • Desired echo tx interval—interval at which the local end would like to transmit echo packets. • local negotiated echo tx interval—interval at which echo packets are being transmitted by the local end. • Echo detection time—local failure detection time of echo packets. It is the product of the local negotiated echo tx interval and the local multiplier. • async detection time—local failure detection time of the asynchronous mode (control packets). It is the product of the remote negotiated async tx interval and the remote multiplier.

Field	Description
Local Stats	Displays the local transmit and receive statistics, • Intervals between async packets—provides measurements on intervals between control packets (tx and rx): ◦ Number of intervals—number of sampled intervals between control packets ◦ min—minimum measured interval between 2 consecutive control packets ◦ max—maximum measured interval between 2 consecutive control packets ◦ avg—average measured interval between 2 consecutive control packets ◦ Last packet received/transmitted—indicates how long ago the last control packet was received/transmitted. • Intervals between echo packets—provides measurements on intervals between echo packets (tx and rx). The measurements have the same meaning as for async packets. • Latency of echo packets (time between tx and rx)—provides measurements on latency of echo packets, i.e. the time between tx and rx of echo packets: ◦ Number of packets—number of sampled echo packets. ◦ min—minimum measured latency for echo packets. ◦ max—maximum measured latency of echo packets. ◦ avg—average measured latency of echo packets.

Field	Description
Session owner information	Provides the following information about the session owner. • Client—name of the client application process. • Desired interval—desired interval provided by the client, in milliseconds. • Multiplier—multiplier value provided by the client.

Related Commands

Command	Description
bfd fast-detect, on page 113	Enables BFD to detect failures in the path between adjacent forwarding engines.
bfd minimum-interval, on page 116	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier, on page 122	Sets the BFD multiplier.
show bfd mib session, on page 154	Displays BFD MIB session information.

show bfd summary

To display the percentage of PPS rate in use per line card, maximum usage of PPS, and total number of sessions, use the **show bfd summary** command in the EXEC mode.

show bfd summary [**private**]**location***node-id*

Syntax Description

private	Displays the private information.
location <i>node-id</i>	Displays BFD counters from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.2.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
bgp	read
ospf	read
isis	read
mpls-te	read

Examples

This example shows the sample output from the **show bfd summary** command for a specified location:

```
RP/0/RP0/CPU0:router#show bfd summary location 0/1/cpu0
```

show bfd summary

Node	PPS %	rate Used	usage Max	Session Total	number Max
0/1/CPU0	0	80	9600	4	4000

This example shows the sample output from the **show bfd summary** command:

```
RP/0/RP0/CPU0:router#show bfd summary
```

Node	PPS %	rate Used	usage Max	Session Total	number Max
0/0/CPU0	0	0	9600	0	4000
0/1/CPU0	0	0	9600	0	4000
0/2/CPU0	0	0	9600	0	4000
0/5/CPU0	0	0	9600	0	4000
0/6/CPU0	0	0	9600	0	4000
0/7/CPU0	0	0	9600	0	4000



Dense Wavelength Division Multiplexing Commands on the Cisco IOS XR Software

This module provides command line interface (CLI) commands for configuring dense wavelength division multiplexing (DWDM) on the Cisco CRS Router.

- [admin-state, page 171](#)
- [controller dwdm, page 173](#)
- [g709 bdi-to-client-gais, page 175](#)
- [g709 disable, page 176](#)
- [g709 fec, page 178](#)
- [g709 odu overhead tti, page 180](#)
- [g709 odu report disable, page 182](#)
- [g709 otu overhead tti, page 184](#)
- [g709 otu report disable, page 186](#)
- [g709 otu threshold, page 188](#)
- [g709 tim-to-client-gais, page 190](#)
- [g709 tti-processing, page 192](#)
- [log signal, page 194](#)
- [loopback \(DWDM\), page 196](#)
- [maintenance disable, page 198](#)
- [network connection id, page 200](#)
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- [network srlg, page 204](#)
- [pm fec report enable, page 205](#)
- [pm fec threshold, page 207](#)
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- [pm optics threshold, page 211](#)
- [pm otn report enable, page 213](#)
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- [proactive, page 219](#)
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- [rx-los-threshold, page 228](#)
- [show controller dwdm, page 230](#)
- [show controller dwdm pm, page 240](#)
- [transmit-power, page 246](#)
- [wavelength, page 248](#)

admin-state

To configure the transport administration state on a DWDM port, use the **admin-state** command in DWDM configuration mode. To return the administration state from a DWDM port to the default, use the **no** form of this command.

admin-state {**in-service**| **maintenance** | **out-of-service**}

no admin-state {**in-service**| **maintenance** | **out-of-service**}

Syntax Description

in-service	Places the DWDM port in In Service (IS) state, to support all normal operation.
maintenance	Places the DWDM port in Out of Service Maintenance (OOS-MT) state to perform configuration, while the laser and G.709 framer remain up.
out-of-service	Places the DWDM port in Out of Service (OOS) state. The laser is turned off and all traffic flow is stopped. This is the default.

Command Default

Out-of-service is the default transport administration state.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced. It replaced the laser and shutdown (DWDM) commands.
Release 3.9.1	The maintenance keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you configure **admin-state maintenance**, the DWDM port is placed in OOS-MT state and any configuration of **maintenance disable** for the port can be overridden. The laser for the port and the G.709 framing remains enabled, and Fast Re-Route (FRR) is triggered. This form of the command is usually used in FRR context for traffic to move over backup path while maintenance is going on.

When you configure **admin-state out-of-service**, the DWDM port is placed in OOS state. The laser is turned off, traffic flow is stopped, and proactive protection is disabled. However, configuration changes can still be made on the port.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to turn on the laser and place a DWDM port in In Service (IS) state:

**Note**

This is a required configuration beginning in Cisco IOS XR Software Release 3.9.0 and later releases. The DWDM cards will not operate without this configuration.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RP0/CPU0:router(config-dwdm)# commit
```

The following example shows how to stop all operation on a DWDM port:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# admin-state out-of-service
```

The following example shows how to enable the out-of-service maintenance transport administration state on a DWDM port:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# admin-state maintenance
```

Related Commands

Command	Description
maintenance disable, on page 198	Provisions a maintenance embargo flag.

controller dwdm

To configure a DWDM controller, use the **controller dwdm** command in global configuration mode. To return to the default state, use the **no** form of this command.

controller dwdm *interface-path-id*

no controller dwdm *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface.
Note	Use the show interfaces command to see a list of all interfaces currently configured on the router.
	For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
dwdm	read, write
interface	read, write
sonet-sdh	read, write

Examples

The following example shows how to configure a DWDM controller in slot 6:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/6/0/0
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 bdi-to-client-gais

To insert a Generic Alarm Indication Signal (GAIS) pattern to client on the detection of a backward defect indication (BDI), use the **g709 bdi-to-client-gais** command in DWDM configuration mode. To disable this feature, use the **no** form of this command.

g709 bdi-to-client-gais

no g709 bdi-to-client-gais

Syntax Description This command has no keywords or arguments.

Command Default By default, no GAIS to client is inserted.

Command Modes DWDM configuration

Command History	Release	Modification
	Release 3.4.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **g709 bdi-to-client-gais** command is available on the 10-GE DWDM PLIM only.

Task ID	Task ID	Operations
	dwdm	read, write

Examples The following example shows how to configure sending a Generic Alarm Indication Signal (GAIS) pattern signal to client when a BDI is received:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RP0/CPU0:router(config-dwdm)# g709 bdi-to-client-gais
```

Related Commands	Command	Description
	show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 disable

To disable the ITU-T G.709 wrapper, use the **g709 disable** command in DWDM configuration mode. To enable the ITU-T G.709 wrapper, use the **no** form of this command.

g709 disable

no g709 disable

Syntax Description This command has no keywords or arguments.

Command Default The G.709 wrapper is enabled.

Command Modes DWDM configuration

Command History	Release	Modification
	Release 3.3.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note The **g709 disable** command is available on the 10-GE DWDM PLIM only.

The G.709 wrapper must be enabled to enable forward error correction (FEC) mode on the controller.

To display the G.709 alarms and counters, use the **show controller dwdm g709** command.

Task ID	Task ID	Operations
	dwdm	read, write

Examples The G.709 wrapper is enabled by default. The following example shows how to disable the G.709 wrapper on an interface:

```
RP/0/RP0/CPU0:Router(config)# controller dwdm 0/6/0/0
RP/0/RP0/CPU0:Router(config-dwdm)# g709 disable
```

If you have disabled the G.709 wrapper using the **g709 disable** command, use the **no g709 disable** command to re-enable it, as shown in the following example:

```
RP/0/RP0/CPU0:Router(config)# controller dwdm 0/6/0/0
RP/0/RP0/CPU0:Router(config-dwdm)# no g709 disable
```

Related Commands

Command	Description
g709 fec, on page 178	Configures the FEC mode for the DWDM controller.
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 fec

To configure the Forward Error Correction (FEC) mode for the DWDM controller, use the **g709 fec** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 fec {[disable]| enhanced| standard| kuy var}

no g709 fec {disable| enhanced| standard}

Syntax Description

disable	Disables FEC.
enhanced	Enables ITU-T G.975.1 I.7 FEC. This is the default. Enables ITU-T G.975.1 I.4 FEC.
	Enables standard FEC mode.

Command Default

Enhanced FEC mode is enabled by default.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

The enhanced FEC mode supported on the Cisco CRS Router (ITU-T G.975.1 I.7) and the Cisco ASR 9000 Series Router (ITU-T G.975.1 I.4) are different and therefore, incompatible. To support interoperability of DWDM between these routers, standard FEC must be configured. The OC-768c/STM-256c DWDM PLIM on the Cisco CRS Router supports enhanced FEC mode only. Disabling FEC or enabling standard FEC is not supported.

The **g709 fec** command can be used only when the DWDM controller port is not operational. In Cisco IOS XR releases prior to Cisco IOS XR Release 3.9.0, you stop operation using the **shutdown (DWDM)** command. Beginning in Cisco IOS XR Release 3.9.0, you stop operation using the **admin-state out-of-service** command.

The G.709 wrapper must be enabled to enable forward error correction (FEC) mode on the controller. Enhanced FEC is the default mode; therefore, if you use the **no g709 fec** command, enhanced FEC is used. To display the FEC mode, use the **show controller dwdm** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the FEC mode on a DWDM controller:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RP0/CPU0:router(config-dwdm)# admin-state out-of-service
RP/0/RP0/CPU0:router(config-dwdm)# commit
RP/0/RP0/CPU0:router(config-dwdm)# g709 fec enhanced

RP/0/RP0/CPU0:router(config-dwdm)# commit
RP/0/RP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RP0/CPU0:router(config-dwdm)# commit
```

Related Commands

Command	Description
admin-state, on page 171	Configures the transport administration state on a DWDM port.
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
g709 bdi-to-client-gais, on page 175	Inserts a GAIS pattern to client on the detection of a BDI.

g709 odu overhead tti

To configure the Trail Trace Identifier (TTI) level for an Optical Channel Data Unit (ODU), use the **g709 odu overhead tti** command in DWDM configuration mode. To return to the default, use the **no** form of this command.

g709 odu overhead tti {expected| sent} {ascii| hex} *tti-string*

no g709 odu overhead tti {expected| sent} {ascii| hex} *tti-string*

Syntax Description

expected	Configures the expected TTI string.
sent	Configures the transmit TTI string.
ascii	Indicates that the string is in ASCII format.
hex	Indicates that the string is in hexadecimal format.
tti-string	The TTI level string. You can configure the TTI level string in ASCII string format or hexadecimal format. The ASCII text string can be a maximum of 64 characters. The hexadecimal string length must be an even number and can be a maximum of 128 bytes.

Command Default

No TTI level string is configured.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.6.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the expected TTI string:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# g709 odu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 odu report disable

To disable the logging of selected Optical Channel Data Unit (ODU) alarms to the console for a DWDM controller, use the **g709 odu report disable** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 odu report {ais| bdi| eoc| lck| oci| ptim| sd-ber| sf-ber| tim} disable

no g709 odu report {ais| bdi| eoc| lck| oci| ptim| sd-ber| sf-ber| tim} disable

Syntax Description

ais	Alarm indication signal reporting status.
bdi	Backward defect indication reporting status.
eoc	GCC end of channel failure reporting status.
lck	Upstream connection locked reporting status.
oci	Open connection indication error reporting status.
pm-tca	Path monitoring BER TCA reporting status.
ptim	Payload type identifier mismatch reporting status.
sd-ber	Set SM BER in excess of SD threshold reporting status.
sf-ber	Set SM BER in excess of SF threshold reporting status.
tim	Set Trace Identifier Mismatch reporting status.

Command Default

Reporting is enabled for all keywords.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.6.0	The tim keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to disable ODU reporting for OCI:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0  
RP/0/RP0/CPU0:router(config-dwdm)# g709 odu report oci disable
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 otu overhead tti

To configure the OTU Trail Trace Identifier (TTI) buffer for a DWDM controller, use the **g709 otu overhead tti** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 otu overhead tti {expected| sent} {ascii| hex} *tii-string*

no g709 otu overhead tti {expected| sent} {ascii| hex} *tii-string*

Syntax Description

expected	Configures the expected TTI string.
sent	Configures the transmit TTI string.
ascii	Indicates that the string is in ASCII format.
hex	Indicates that the string is in hexadecimal format.
tii-string	The TTI string. A maximum of 64 characters is allowed.

Command Default

No TTI string is configured

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To display the TTI strings, use the **show controller dwdm g709** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the expected TTI string:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0/CPU0:router(config-dwdm)# g709 otu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 otu report disable

To disable the logging of selected Optical Channel Transport Unit (OTU) alarms to the console for a DWDM controller, use the **g709 otu report disable** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 otu report {ais| bdi| eoc| fecmismatch| iae| lof| lom| los| sd-ber| sf-ber| tim} disable

no g709 otu report {ais| bdi| eoc| fecmismatch| iae| lof| lom| los| sd-ber| sf-ber| tim} disable

Syntax Description

ais	Alarm indication signal reporting status.
bdi	Backward defect indication reporting status.
eoc	GCC end of channel failure reporting status.
fecmismatch	FEC mismatch alarm reporting status.
iae	Incoming alignment error reporting status.
lof	OTU loss of frame reporting status.
lom	Loss of multiple frame reporting status.
los	Loss of signal reporting status.
sd-ber	SM bit error rate (BER) is in excess of the signal degradation BER threshold.
sf-ber	SM BER is in excess of the signal failure BER threshold.
sm-tca	Section monitoring BER TCA reporting status.
tim	Trace Identifier Mismatch reporting status.

Command Default

Reporting is enabled for all keywords.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.6.0	The tim keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to disable OTU reporting for IAE:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0  
RP/0/RP0/CPU0:router(config-dwdm)# g709 otu report iae disable
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 otu threshold

To configure thresholds for selected Optical Channel Transport Unit (OTU) bit error rate (BER) alarms, use the **g709 otu threshold** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 otu threshold {sd-ber| sf-ber} bit-error-rate

no g709 otu threshold {sd-ber| sf-ber} bit-error-rate

Syntax Description

sd-ber <i>bit-error-rate</i>	Signal degradation bit error rate (BER) in the range 1 to 9, where <i>bit-error-rate</i> specifies a negative exponent of base 10 (10– <i>bit-error-rate</i>). The default is 6 (10–6).
sf-ber <i>bit-error-rate</i>	Signal failure BER above threshold in the range 1 to 9, where <i>bit-error-rate</i> specifies a negative exponent of base 10 (10– <i>bit-error-rate</i>). The default is 3 (10–3).

Command Default

The default bit error rate for **sd-ber** is 6.

The default bit error rate for **sf-ber** is 3.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to set the signal fail BER rate to be 5:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
```



```
RP/0/RP0/CPU0:router(config-dwdm)# g709 otu threshold sf-ber 5
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 tim-to-client-gais

To insert a Generic Alarm Indication Signal (GAIS) on the client side when a Trace Identifier Mismatch (TIM) is detected, use the **g709 tim-to-client-gais** command in DWDM configuration mode. To disable this feature, use the **no** form of this command.

g709 tim-to-client-gais

no g709 tim-to-client-gais

Syntax Description This command has no keywords or arguments.

Command Default By default, no GAIS to client is inserted.

Command Modes DWDM configuration

Command History	Release	Modification
	Release 3.6.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note The **g709 tim-to-client-gais** command is available on the 10-GE DWDM PLIM only.

Task ID	Task ID	Operations
	dwdm	read, write

Examples The following example shows how to configure a GAIS to client when a TIM is received:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# g709 tim-to-client-gais
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 tti-processing

To enable Trace Identifier Mismatch (TIM) alarms, use the **g709 tti-processing** command in DWDM configuration mode. To disable TIM alarms, use the **no** form of this command.

g709 tti-processing

no g709 tti-processing

Syntax Description

This command has no keywords or arguments.

Command Default

By default, trace identifier mismatch (TIM) alarms are disabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.6.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

Trace identifier mismatch (TIM) alarms can be set only when TTI processing is enabled.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the expected TTI string:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# g709 tti-processing
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

log signal

To enable 10 millisecond proactive monitoring of Forward Error Correction-Fast Re-Route (FEC-FRR), use the **log signal** command in DWDM configuration mode. To disable proactive monitoring, use the no form of this command.

log signal *file-name*

no log signal *file-name*

Syntax Description

<i>file-name</i>	Specifies the name of the log file.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable 10 millisecond proactive monitoring of Forward Error Correction-Fast Re-Route (FEC-FRR).

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# log signal LogFile1
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

loopback (DWDM)

To configure the DWDM controller for loopback mode, use the **loopback** command in DWDM configuration mode. To remove the loopback DWDM command from the configuration file, use the **no** form of this command.

loopback {internal| line}

no loopback {internal| line}

Syntax Description

internal	Specifies that all the packets be looped back to the router.
line	Specifies that the incoming network packets be looped back to the DWDM network.

Command Default

This command is disabled by default.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The DWDM controller supports two loopback operation modes for diagnostic purposes: internal and line. The terminal (internal) loopback mode allows the received data from the Layer 2 Framer (for example, a SONET/SDH framer for POS or Ethernet MAC for 10GE) of the PLIM to be looped back to the ingress side of the Framer. This allows the packets to be looped back to the PLIM. The line loopback mode allows the received trunk/DWDM line Rx to be connected to the trunk/DWDM line Tx towards the line. This is used for line diagnostics.

Task ID

Task ID	Operations
dwdm	read, write

Examples

In the following example, all packets are looped back to the DWDM controller:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
```



```
RP/0/RP0/CPU0:router(config-dwdm)# loopback internal
```

maintenance disable

To provision a maintenance embargo flag, use the **maintenance disable** command in interface configuration mode. To remove a maintenance embargo flag, use the no form of this command.

maintenance disable

no maintenance disable

Syntax Description This command has no keywords or arguments.

Command Default Maintenance embargo flags are not provisioned.

Command Modes Interface configuration

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

A maintenance embargo flag prevents maintenance activities from being performed on an interface.

To display the status of whether maintenance is enabled or disabled on an interface, use the **show interface pos** command or the **show interface tenGigE** command.

Task ID	Operations
dwdm	read
interface	read, write

Examples The following examples show how to provision a maintenance embargo flag:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface pos 1/0/1/1
RP/0/RP0/CPU0:Router(config-if)# maintenance disable
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:Router(config)# interface tengige 1/0/1/1
```

```
RP/0/RP0/CPU0:Router(config-if)# maintenance disable
```

Related Commands

Command	Description
admin-state, on page 171	Configures the transport administration state on a DWDM port.

network connection id

To configure a connection identifier for the Multi Service Transport Protocol (MSTP), use the **network connection id** command in DWDM configuration mode. To remove a connection identifier, use the no form of this command.

network connection id *id-number*

no network connection id *id-number*

Syntax Description

id-number	Connection identifier.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure a connection identifier for the Multi Service Transport Protocol (MSTP).

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# network connection id 1/1/1/1
```

Related Commands

Command	Description
network srlg , on page 204	Configures a SRLG on a DWDM controller.
network port id, on page 202	Assigns an identifier number to a port for the MSTP.

network port id

To assign an identifier number to a port for the Multi Service Transport Protocol (MSTP), use the **network port id** command in DWDM configuration mode. To remove an identifier number from a port, use the no form of this command.

network port id *id-number*

no network port id *id-number*

Syntax Description

id-number	Port identifier.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to assign an identifier number to a port for the Multi Service Transport Protocol (MSTP):

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# network port id 1/0/1/1
```

Related Commands

Command	Description
network srlg , on page 204	Configures a SRLG on a DWDM controller.
network connection id, on page 200	Configures a connection identifier for the MSTP.

network srlg

To configure a Shared Risk Link Group (SRLG) on a DWDM controller, use the **network srlg** command in DWDM configuration mode. To remove an SRLG, use the no form of this command.

network srlg *value1 value2 value3*

no network srlg *value1 value2 value3*

Syntax Description

value1 value2 value3

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure a Shared Risk Link Group (SRLG) on a DWDM controller:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# network srlg value1 value2 value3
```

Related Commands

Command	Description
network port id, on page 202	Assigns an identifier number to a port for the MSTP.
network connection id, on page 200	Configures a connection identifier for the MSTP.

pm fec report enable

To enable Threshold Crossing Alert (TCA) generation for FEC, use the **pm fec report enable** command in DWDM configuration mode. To disable TCAs, use the **no** form of this command.

pm {15-min| 24-hour} fec report {ec-bits| uc-words} enable

no pm {15-min| 24-hour} fec report {ec-bits| uc-words} enable

Syntax Description

15-min	Configures the TCA generation for 15-minute intervals.
24-hour	Configures TCA generation for 24-hour intervals.
ec-bits	Bit errors corrected (BIEC). Indicates the number of bit errors corrected in the DWDM trunk line during the performance monitoring time interval.
uc-words	Uncorrectable words. This is the number of uncorrectable words detected in the DWDM trunk line during the performance monitoring time interval.

Command Default

TCA is not enabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To display FEC performance measurement information, use the **show controller dwdm pm fec** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable TCAs in FEC reporting for uncorrectable words:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0/CPU0:router(config-dwdm)# pm 15-min fec report uc-words enable
```

Related Commands

Command	Description
show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

pm fec threshold

To configure performance monitoring thresholds on the FEC layer, use the **pm fec threshold** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

pm {15-min| 24-hour} fec threshold {ec-bits| uc-words} threshold

no pm {15-min| 24-hour} fec threshold {ec-bits| uc-words} threshold

Syntax Description

15-min	Configures the performance monitoring thresholds for 15-minute intervals.
24-hour	Configures performance monitoring thresholds for 24-hour intervals.
ec-bits	Bit errors corrected (BIEC). Indicates the number of bit errors corrected in the DWDM trunk line during the performance monitoring time interval.
uc-words	Uncorrectable Words. This is the number of uncorrectable words detected in the DWDM trunk line during the performance monitoring time interval.
threshold	Threshold for the performance monitoring parameter in the range 1–4294967295.

Command Default

No threshold is configured.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To display performance measurement information for the FEC layer, use the **show controller dwdm pm fec** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure an FEC layer performance monitoring threshold for uncorrectable words:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0  
RP/0/RP0/CPU0:router(config-dwdm)# pm 15-min fec threshold uc-words 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 240	Displays performance monitoring information for a DWDM controller.

pm optics report enable

To enable Threshold Crossing Alert (TCA) generation on the optics layer, use the **pm optics report enable** command in DWDM configuration mode. To disable TCA reporting, use the **no** form of this command.

pm {15-min| 24-hour} optics report {lbc| opr| opt} {max-tca| min-tca} enable

no pm {15-min| 24-hour} optics report {lbc| opr| opt} {max-tca| min-tca} enable

Syntax Description

15-min	Configures TCA generation for 15-minute intervals.
24-hour	Configures TCA generation for 24-hour intervals.
lbc	Laser bias current.
opr	Optical power on the unidirectional port.
opt	Transmit optical power in dBm.
max-tca	Indicates that the maximum value of the parameter is compared against the threshold to determine if a TCA should be generated.
min-tca	Indicates that the minimum value of the parameter is compared against the threshold to determine if a TCA should be generated.

Command Default

TCA reporting is not enabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To display performance monitoring information for the optics, use the **show controller dwdm pm optics** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable TCA reporting on the optics layer reporting for the maximum OPT:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0  
RP/0/RP0/CPU0:router(config-dwdm)# pm 15-min optics report opt max-tca enable
```

Related Commands

Command	Description
show controller dwdm pm, on page 240	Displays performance monitoring information for a DWDM controller.

pm optics threshold

To configure performance monitoring thresholds on the optics layer, use the **pm optics threshold** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

pm {15-min| 24-hour} optics threshold {lbc| opr| opt} {max| min} *threshold*

no pm {15-min| 24-hour} optics threshold {lbc| opr| opt} {max| min} *threshold*

Syntax Description

15-min	Configures the performance monitoring thresholds for 15-minute intervals.
24-hour	Configures performance monitoring thresholds for 24-hour intervals.
lbc	Laser bias current.
opr	Optical power on the unidirectional port.
opt	Transmit optical power in dBm.
max	Indicates that the <i>threshold</i> is for the maximum value of the parameter.
min	Indicates that the <i>threshold</i> is for the minimum value of the parameter.
threshold	Threshold for the performance monitoring parameter.

Command Default

No thresholds are configured.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To display performance monitoring information for the optics layer, use the **show controller dwdm pm optics** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure an optics layer performance monitoring threshold for maximum OPT:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0  
RP/0/RP0/CPU0:router(config-dwdm)# pm 15-min optics threshold opt max 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 240	Displays performance monitoring information for a DWDM controller.

pm otn report enable

To enable Threshold Crossing Alert (TCA) generation on the Optical Transport Network (OTN) layer, use the **pm otn report enable** command in DWDM configuration mode. To disable TCA reporting, use the **no** form of this command.

pm {15-min| 24-hour} otn report *otn-parameter* enable

no pm {15-min| 24-hour} otn report *otn-parameter* enable

Syntax Description

15-min	Configures TCA generation for 15-minute intervals.
24-hour	Configures TCA generation for 24-hour intervals.
otn-parameter	Specific parameter for which to configure the threshold. OTN parameters can be as follows: • bbe-pm-fe—Far-end path monitoring background block errors (BBE-PM). Indicates the number of background block errors recorded in the optical transport network (OTN) path during the performance monitoring time interval. • bbe-pm-ne—Near-end path monitoring background block errors (BBE-PM). • bbe-sm-fe—Far-end section monitoring background block errors (BBE-SM). Indicates the number of background block errors recorded in the OTN section during the performance monitoring time interval. • bbe-sm-ne—Near-end section monitoring background block errors (BBE-SM). • bber-pm-fe—Far-end path monitoring background block errors ratio (BBER-PM). Indicates the background block errors ratio recorded in the OTN path during the performance monitoring time interval. • bber-pm-ne—Near-end path monitoring background block errors ratio (BBER-PM). • bber-sm-fe—Far-end section monitoring background block errors ratio (BBER-SM). Indicates the background block errors ratio recorded in the OTN section during the performance monitoring time interval. • bber-sm-ne—Near-end section monitoring background block errors ratio (BBER-SM). • es-pm-fe—Far-end path monitoring errored seconds (ES-PM). Indicates the errored seconds recorded in the OTN path during the performance monitoring time interval. • es-pm-ne—Near-end path monitoring errored seconds (ES-PM). • es-sm-fe—Far-end section monitoring errored seconds (ES-SM). Indicates the errored seconds recorded in the OTN section during the performance monitoring time interval. • es-sm-ne—Near-end section monitoring errored seconds (ES-SM). • esr-pm-fe—Far-end path monitoring errored seconds ratio (ESR-PM). Indicates the errored seconds ratio recorded in the OTN path during the performance monitoring time interval.

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- **esr-pm-ne**—Near-end path monitoring errored seconds ratio (ESR-PM).
 - **esr-sm-fe**—Far-end section monitoring errored seconds ratio (ESR-SM). Indicates the errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
 - **esr-sm-ne**—Near-end section monitoring errored seconds ratio (ESR-SM).
 - **fc-pm-fe**—Far-end path monitoring failure counts (FC-PM). Indicates the failure counts recorded in the OTN path during the performance monitoring time interval.
 - **fc-pm-ne**—Near-end path monitoring failure counts (FC-PM).
 - **fc-sm-fe**—Far-end section monitoring failure counts (FC-SM). Indicates the failure counts recorded in the OTN section during the performance monitoring time interval.
 - **fc-sm-ne**—Near-end section monitoring failure counts (FC-SM).
 - **ses-pm-fe**—Far-end path monitoring severely errored seconds (SES-PM). Indicates the severely errored seconds recorded in the OTN path during the performance monitoring time interval.
 - **ses-pm-ne**—Far-end path monitoring severely errored seconds (SES-PM).
 - **ses-sm-fe**—Far-end section monitoring severely errored seconds (SES-SM). Indicates the severely errored seconds recorded in the OTN section during the performance monitoring time interval.
 - **ses-sm-ne**—Near-end section monitoring severely errored seconds (SES-SM).
 - **sesr-pm-fe**—Far-end path monitoring severely errored seconds ratio (SESR-PM). Indicates the severely errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
 - **sesr-pm-ne**—Near-end path monitoring severely errored seconds ratio (SESR-PM).
 - **sesr-sm-fe**—Far-end section monitoring severely errored seconds ratio (SESR-SM). Indicates the severely errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
 - **sesr-sm-ne**—Near-end section monitoring severely errored seconds ratio (SESR-SM).
 - **uas-pm-fe**—Far-end path monitoring unavailable seconds (UAS-PM). Indicates the unavailable seconds recorded in the OTN path during the performance monitoring time interval.
 - **uas-pm-ne**—Near-end path monitoring unavailable seconds (UAS-PM).
 - **uas-sm-fe**—Far-end section monitoring unavailable seconds (UAS-SM). Indicates the unavailable seconds recorded in the OTN section during the performance monitoring time interval.
 - **uas-sm-ne**—Near-end section monitoring unavailable seconds (UAS-SM).
-

Command Default

TCA generation is not enabled.

Command Modes DWDM configuration

Command History	Release	Modification
	Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To display performance measurement information for the OTN layer, use the **show controller dwdm pm otn** command.

Task ID	Task ID	Operations
	dwdm	read, write

Examples

The following example shows how to enable TCA generation on the OTN layer reporting for the path monitoring errored seconds ratio (ESR-PM):

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0/CPU0:router(config-dwdm)# pm 15-min otn report esr-pm-fe enable
```

Related Commands	Command	Description
	show controller dwdm pm, on page 240	Displays performance monitoring information for a DWDM controller.

pm otn threshold

To configure performance monitoring thresholds on the optical transport network (OTN) layer, use the **pm otn threshold** command in DWDM configuration mode. To disable TCA reporting, use the **no** form of this command.

pm {15-min| 24-hour} otn threshold *otn-paramter* enable

no pm {15-min| 24-hour} otn threshold *otn-paramter* enable

Syntax Description

15-min	Configures performance monitoring thresholds for 15-minute intervals.
24-hour	Configures performance monitoring thresholds for 24-hour intervals.
otn-parameter	Specific parameter for which to configure the threshold. OTN parameters can be as follows: • bbe-pm-fe—Far-end path monitoring background block errors (BBE-PM). Indicates the number of background block errors recorded in the optical transport network (OTN) path during the performance monitoring time interval. • bbe-pm-ne—Near-end path monitoring background block errors (BBE-PM). • bbe-sm-fe—Far-end section monitoring background block errors (BBE-SM). Indicates the number of background block errors recorded in the OTN section during the performance monitoring time interval. • bbe-sm-ne—Near-end section monitoring background block errors (BBE-SM). • bber-pm-fe—Far-end path monitoring background block errors ratio (BBER-PM). Indicates the background block errors ratio recorded in the OTN path during the performance monitoring time interval. • bber-pm-ne—Near-end path monitoring background block errors ratio (BBER-PM). • bber-sm-fe—Far-end section monitoring background block errors ratio (BBER-SM). Indicates the background block errors ratio recorded in the OTN section during the performance monitoring time interval. • bber-sm-ne—Near-end section monitoring background block errors ratio (BBER-SM). • es-pm-fe—Far-end path monitoring errored seconds (ES-PM). Indicates the errored seconds recorded in the OTN path during the performance monitoring time interval. • es-pm-ne—Near-end path monitoring errored seconds (ES-PM). • es-sm-fe—Far-end section monitoring errored seconds (ES-SM). Indicates the errored seconds recorded in the OTN section during the performance monitoring time interval. • es-sm-ne—Near-end section monitoring errored seconds (ES-SM).

-
- **esr-pm-fe**—Far-end path monitoring errored seconds ratio (ESR-PM). Indicates the errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
 - **esr-pm-ne**—Near-end path monitoring errored seconds ratio (ESR-PM).
 - **esr-sm-fe**—Far-end section monitoring errored seconds ratio (ESR-SM). Indicates the errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
 - **esr-sm-ne**—Near-end section monitoring errored seconds ratio (ESR-SM).
 - **fc-pm-fe**—Far-end path monitoring failure counts (FC-PM). Indicates the failure counts recorded in the OTN path during the performance monitoring time interval.
 - **fc-pm-ne**—Near-end path monitoring failure counts (FC-PM).
 - **fc-sm-fe**—Far-end section monitoring failure counts (FC-SM). Indicates the failure counts recorded in the OTN section during the performance monitoring time interval.
 - **fc-sm-ne**—Near-end section monitoring failure counts (FC-SM).
 - **ses-pm-fe**—Far-end path monitoring severely errored seconds (SES-PM). Indicates the severely errored seconds recorded in the OTN path during the performance monitoring time interval.
 - **ses-pm-ne**—Far-end path monitoring severely errored seconds (SES-PM).
 - **ses-sm-fe**—Far-end section monitoring severely errored seconds (SES-SM). Indicates the severely errored seconds recorded in the OTN section during the performance monitoring time interval.
 - **ses-sm-ne**—Near-end section monitoring severely errored seconds (SES-SM).
 - **sesr-pm-fe**—Far-end path monitoring severely errored seconds ratio (SESr-PM). Indicates the severely errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
 - **sesr-pm-ne**—Near-end path monitoring severely errored seconds ratio (SESr-PM).
 - **sesr-sm-fe**—Far-end section monitoring severely errored seconds ratio (SESr-SM). Indicates the severely errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
 - **sesr-sm-ne**—Near-end section monitoring severely errored seconds ratio (SESr-SM).
 - **uas-pm-fe**—Far-end path monitoring unavailable seconds (UAS-PM). Indicates the unavailable seconds recorded in the OTN path during the performance monitoring time interval.
 - **uas-pm-ne**—Near-end path monitoring unavailable seconds (UAS-PM).
-
- **uas-sm-fe**—Far-end section monitoring unavailable seconds (UAS-SM). Indicates the unavailable seconds recorded in the OTN section during the performance monitoring time interval.
 - **uas-sm-ne**—Near-end section monitoring unavailable seconds (UAS-SM).
-

threshold	Threshold for the performance monitoring parameter.

Command Default No thresholds are configured.

Command Modes DWDM configuration

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To display performance measurement information for the OTN layer, use the **show controller dwdm pm otn** command.

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure an OTN layer performance monitoring threshold for path monitoring errored seconds ratio (ESR-PM):

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0/CPU0:router(config-dwdm)# pm 15-min otn threshold esr-pm-ne 500000
```

Command	Description
show controller dwdm pm, on page 240	Displays performance monitoring information for a DWDM controller.

proactive

To enable automatic triggering of Forward Error Correction-Fast Re-Route (FEC-FRR), use the **proactive** command in DWDM configuration mode. To disable automatic triggering, use the no form of this command.

proactive

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable automatic triggering of Forward Error Correction-Fast Re-Route (FEC-FRR):

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# proactive
```

Related Commands

Command	Description
show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive revert threshold

To configure the revert threshold to trigger reverting from the Forward Error Correction-Fast Re-Route (FEC-FRR) route back to the original route, use the **proactive revert threshold** command in DWDM configuration mode. To remove the revert threshold, use the no form of this command.

proactive revert threshold *x-coefficient y-power*

no proactive revert threshold *x-coefficient y-power*

Syntax Description

x-coefficient	Bit error rate coefficient (x of xE-y) . The range is 1 to 9. Default is 1.
y-power	Bit error rate exponent (y of xE-y). The range is 3 to 9.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the revert threshold for FEC-FRR:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# proactive revert threshold 1 9
```


Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive revert window

To configure the revert window in which reverting from the Forward Error Correction-Fast Re-Route (FEC-FRR) route back to the original route is triggered, use the **proactive revert window** command in DWDM configuration mode. To remove the revert window, use the no form of this command.

proactive revert window *window*

no proactive revert window *window*

Syntax Description	
window	The length of time (in milliseconds) of the window in which reverting from FEC-FRR may be triggered. The range is 2000 to 100000.

Command Default	No default behavior or values

Command Modes	DWDM configuration

Command History	Release	Modification
	Release 3.9.0	This command was introduced.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID	Task ID	Operations
	dwdm	read, write

Examples	The following example shows how to configure the window in which reverting from FEC-FRR may be triggered:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# proactive revert window 100000
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive trigger threshold

To configure the trigger threshold of Forward Error Correction-Fast Re-Route (FEC-FRR), use the **proactive trigger threshold** command in DWDM configuration mode. To remove the trigger threshold, use the no form of this command.

proactive trigger threshold *x-coefficient y-power*

no proactive trigger threshold *x-coefficient y-power*

Syntax Description

x-coefficient	Bit error rate coefficient (x of xE-y) . The range is 1 to 9. Default is 1.
y-power	Bit error rate exponent (y of xE-y). The range is 3 to 9.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the trigger threshold of Forward Error Correction-Fast Re-Route (FEC-FRR)

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# proactive trigger threshold 1 9
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive trigger window

To configure the trigger window (in milliseconds) in which Fast Re-Route may be triggered, use the **proactive trigger window** command in DWDM configuration mode. To remove the trigger window, use the no form of this command.

proactive trigger window *window*

no proactive trigger window *window*

Syntax Description

window	The length of time (in milliseconds) of the window in which FEC-FRR may be triggered. The range is 10 to 10000.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the trigger window (in milliseconds) in which triggering of Fast Re-Route may happen:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# proactive trigger window 10000
```

Related Commands

Command	Description
show controller dwdm, on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

rx-los-threshold

To configure the transponder receive power threshold on a DWDM controller, use the **rx-los-threshold** command in DWDM configuration mode. To return the transponder receive power threshold to its default value, use the **no** form of this command.

rx-los-threshold power-level

no rx-los-threshold power-level

Syntax Description

<i>power-level</i>	Receive power level in units of 0.1 dBm. Values can range from -350 to 50, which corresponds to a LOS threshold range of -35 dBm to 5 dBm.

Command Default

The default *power-level* is -19.5 dBm.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced. It is supported only on the OC-768c/STM-256c DWDM PLIM.
Release 3.6.0	The value for the <i>power-level</i> argument was changed from -200 to 0, to -350 to 50.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **rx-los-threshold** command can be used only when the DWDM controller port is not operational. In Cisco IOS XR releases prior to Cisco IOS XR Release 3.9.0, you stop operation using the **shutdown (DWDM)** command. Beginning in Cisco IOS XR Release 3.9.0, you stop operation using the **admin-state out-of-service** command.

The **rx-los-threshold** command is applicable only to the OC-768c/STM-256c DWDM PLIM.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the receive power threshold to -10 dBm:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0/CPU0:router(config-dwdm)# rx-los-threshold -100
```

Related Commands

Command	Description
admin-state , on page 171	Configures the transport administration state on a DWDM port.
show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
transmit-power , on page 246	Configures the DWDM optics transmit laser power on a DWDM controller.

show controller dwdm

To display optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller, use the **show controller dwdm** command in EXEC mode.

show controller dwdm interface-path-id [g709 [registers]] log optics [registers] proactive status srlg tdc wavelength-map]

Syntax Description

interface-path-id	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
g709	(Optional) Displays the G.709 Optical Transport Network (OTN) protocol alarms and counters for bit errors, along with the FEC statistics and threshold-based alerts.
log	(Optional) Displays information about signal logging.
optics	(Optional) Displays optical related information about the interface, such as output power level and wavelength.
registers	(Optional) For g709 , displays platform-specific OTN framer registers; for optics , displays transponder registers.
proactive status	(Optional) Displays proactive status information.
srlg	(Optional) Displays Shared Risk Link Group (SRLG) information.
tdc	(Optional) Displays tunable dispersion compensator (TDC) information.
wavelength-map	(Optional) Displays the wavelength information.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.4.0	The display of the TTI strings was added.
Release 3.6.0	Tunable dispersion compensator (TDC) information was added.

Release	Modification
Release 3.9.0	The Transport Admin State output field was added, and the output for the FEC Mode field was modified to display the type of Enhanced FEC configured.
Release 3.9.1	The srlg and proactive status keywords were added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read
interface	read
sonet-sdh	read

Examples

The following example shows the output from the **show controllers dwdm** command on a 10-GE DWDM PLIM (prior to Cisco IOS XR Release 3.9.0):

```
RP/0/RP0/CPU0:Router# show controller dwdm 0/6/0/0
```

```
Port dwdm 0/6/0/0
```

```
Controller State: up
```

```
Loopback: None
```

```
G709 Status
```

```
OTU
```

```

      LOS  = 0          LOF  = 0          LOM  = 0
      BDI  = 0          IAE  = 0          BIP  = 0
      BEI  = 0          TIM  = 0

```

```
ODU
```

```

      AIS  = 0          BDI  = 0          OCI  = 0
      LCK  = 0          BIP  = 0          BEI  = 0
      PTIM = 0          TIM  = 0

```

```
FEC Mode: Enhanced FEC(default)
```

```

      EC(current second) = 0          EC  = 0          UC  = 0
      pre-FEC BER < 2.35E-11          Q  > 6.66          Q Margin > 7.52 dBQ

```

```
Remote FEC Mode: Unknown
```

```
FECMISMATCH = 0
```

```
Detected Alarms: LOS
```

```
Asserted Alarms: LOS
```

```
Alarm Reporting Enabled for: LOS LOF LOM IAE OTU-BDI OTU-TIM OTU_SF_BER OTU_SD_BER ODU-AIS
      ODU-BDI OCI LCK PTIM ODU-TIM FECMISMATCH
```

BER Thresholds: OTU-SF = 10e-3 OTU-SD = 10e-6

OTU TTI Sent String ASCII: Tx TTI Not Configured
 OTU TTI Received String ASCII: Rx TTI Not Recieved
 OTU TTI Expected String ASCII: Exp TTI Not Configured

ODU TTI Sent String ASCII: Tx TTI Not Configured
 ODU TTI Received String ASCII: Rx TTI Not Recieved
 ODU TTI Expected String ASCII: Exp TTI Not Configured

Optics Status

Optics Type: DWDM
 Wavelength Info: C-Band, MSA ITU Channel=1, Frequency=196.10THz,
 Wavelength=1528.773nm
 TX Power = 0.07 dBm
 RX Power = -43.35 dBm
 RX LOS Threshold = -17.00 dBm

TDC Info

TDC Not Supported on the Plim

The following example shows the output from the **show controllers dwdm** command on a OC-768c/STM-256c DWDM PLIM (prior to Cisco IOS XR Release 3.9.0):

RP/0/RP0/CPU0:Router# **show controller dwdm 0/4/0/0**

Port dwdm 0/4/0/0

Controller State: admin-down

Loopback: None

G709 Status

OTU

LOS = 0	LOF = 0	LOM = 0
BDI = 0	IAE = 0	BIP = 0
BEI = 0	TIM = 0	

ODU

AIS = 0	BDI = 0	OCI = 0
LCK = 0	BIP = 0	BEI = 0
PTIM = 0	TIM = 0	

FEC Mode: Enhanced FEC(default)

EC(current second) = 0	EC = 0	UC = 0
pre-FEC BER < 2.35E-11	Q > 6.66	Q Margin > 7.52 dBQ

Remote FEC Mode: Unknown

FECMISMATCH = 0

Detected Alarms: None

Asserted Alarms: None

Alarm Reporting Enabled for: LOS LOF LOM IAE OTU-BDI OTU-TIM OTU_SF_BER OTU_SD_BER ODU-AIS
 ODU-BDI OCI LCK PTIM ODU-TIM FECMISMATCH

BER Thresholds: OTU-SF = 10e-3 OTU-SD = 10e-6

OTU TTI Sent String ASCII: Tx TTI Not Configured
 OTU TTI Received String ASCII: Rx TTI Not Recieved
 OTU TTI Expected String ASCII: Exp TTI Not Configured

ODU TTI Sent String ASCII: Tx TTI Not Configured
 ODU TTI Received String ASCII: Rx TTI Not Recieved
 ODU TTI Expected String ASCII: Exp TTI Not Configured

Optics Status

Optics Type: DWDM
 Wavelength Info: C-Band, MSA ITU Channel=1, Frequency=196.10THz,
 Wavelength=1528.773nm

```

TX Power = 1.01 dBm
RX Power = -99.99 dBm
RX LOS Threshold = -17.00 dBm
TDC Info

```

```

Operational Mode: AUTO
Status :          ACQUIRING
Dispersion Setting : 0 ps/nm

```

The following example shows updated output from the **show controllers dwdm** command on a Cisco CRS-1 router in Cisco IOS XR Release 3.9.0:

```

RP/0/RP0/CPU0:Router(config-dwdm)# show controllers dwdm 0/0/0/0
Mon Aug  3 10:29:09.799 UTC

```

```

Port dwdm0/0/0/0

```

```

Controller State: up

```

```

Transport Admin State: OOS (Out-of-Service)

```

```

Loopback: None

```

```

G709 Status

```

```

OTU

```

```

LOS  = 0      LOF  = 0      LOM  = 0
BDI  = 0      IAE  = 0      BIP  = 0
BEI  = 0      TIM  = 0

```

```

ODU

```

```

AIS  = 0      BDI  = 0      OCI  = 0
LCK  = 0      BIP  = 0      BEI  = 0
PTIM = 0      TIM  = 0

```

```

FEC Mode: Enhanced FEC G.975.1 1.7 (Default)

```

```

EC(current second) = 0      EC  = 0      UC  = 0
pre-FEC BER < 9.00E-11      Q  > 6.45      Q Margin > 7.25

```

```

Remote FEC Mode: Unknown
FECMISMATCH = 0

```

```

Detected Alarms: None

```

```

Asserted Alarms: None

```

```

Alarm Reporting Enabled for: LOS LOF LOM IAE OTU-BDI OTU-TIM OTU_SF_BER OTU_SD_BER ODU-AIS
ODU-BDI OCI LCK PTIM ODU-TIM FECMISMATCH

```

```

BER Thresholds: OTU-SF = E-3 OTU-SD = E-6

```

```

Connectivity Info

```

```

Network Port ID: Unavailable
Network Connection ID: Unavailable

```

```

OTU TTI Sent      String ASCII: Tx TTI Not Configured
OTU TTI Received String ASCII: Rx TTI Not Recieved
OTU TTI Expected String ASCII: Exp TTI Not Configured

```

```

ODU TTI Sent      String ASCII: Tx TTI Not Configured
ODU TTI Received String ASCII: Rx TTI Not Recieved
ODU TTI Expected String ASCII: Exp TTI Not Configured

```

```

Optics Status

```

```

Optics Type: 10Gb MSA WDM (65km)
Wavelength Info: C-Band, MSA ITU Channel=3, Frequency=196.00THz,
Wavelength=1529.553nm
TX Power = -50.00 dBm
RX Power = -47.19 dBm
TDC Info

```

TDC Not Supported on the Plim

Network SRLG values:

Not Configured

This table describes selected fields from the **show controllers dwdm** command output.

Table 15: show controllers dwdm Command Output Field Descriptions

Field	Description
AIS	Number of alarm indication signal (AIS) alarms. AIS is a signal sent downstream as an indication that an upstream defect has been detected.
Alarm reporting enabled for	Lists the alarms that are enabled for reporting.
Asserted Alarms	Alarms indicated to be reported by the user.
BDI	Number of backward defect indication (BDI) alarms. The BDI is a single bit that conveys information regarding signal failure in the upstream direction.
BER thresholds	Values of the configured bit error rate thresholds.
BIP	Number of bit interleaved parity alarms. The BIP is comprised of one byte and is used for error detection. It is computed over the entire optical channel payload unit (OPU).
Controller State	Status of the controller.
Detected Alarms	Alarms detected by the hardware.
EC	Corrected code words. This is the number of words corrected by the FEC and is displayed as a per second rate.
FEC Mode	Indicates the forward error correction (FEC) mode for the controller. This can be Disabled, Enhanced FEC G.975.1 1.7 (Default), or Standard FEC.
IAE	Number of incoming alignment errors (IAE).
LCK	Number of upstream connection locked alarms. LCK is a signal sent downstream as an indication that upstream the connection is locked, and no signal is passed through.
LOF	Number of OTU loss of frame (LOF) alarms.
LOM	Number of OTU loss of multiframe (LOM) alarms.

Field	Description
Loopback	Loopback status. Indicates whether or not loopback is enabled and the type of loopback enabled.
LOS	Number of OTU loss of signal (LOS) alarms. The LOS threshold is set using the rx-los-threshold command. If the receive optical power is less than or equal to this defined threshold, the optical LOS alarm is raised.
OCI	Number of open connection indication alarms. OCI is a signal sent downstream as an indication that upstream the signal is not connected to a trail termination source.
ODU	Optical channel data unit alarms.
OTU	Optical transport unit overhead alarms.
OTU TTI Expected	Value of the expected TTI.
OTU TTI Received	Value of the received TTI.
OTU TTI Sent	Value of the transmit trail trace identifier (TTI).
PTIM	Number of payload type identifier mismatch alarms. This occurs when there is a mismatch between the way the ITU-T G.709 option is configured on the PLIM at each end of the optical span.
TDC Info	Tunable Dispersion Compensator (TDC) information.
Transport Admin State	Current status of the port as set by the admin-state command. Possible values are: IS (In-Service) and OOS (Out-of-Service).
UC	Uncorrectable code words. This is a raw counter.
Pre-FEC BER	Pre - bit error rate (BER) forward error correction (FEC). The pre-FEC BER is calculated using pre-forward error correction (FEC) error counts.
Q	The general signal quality bit error rate (BER) per voltage. The Q and Q margin are calculated using the Pre-FEC BER.
Q Margin	The general signal quality bit error rate (BER) per voltage. The Q and Q margin are calculated using the Pre-FEC BER.

Field	Description
Operational Mode	Indicates whether the tunable dispersion compensator (TDC) operational mode option is set to Auto or Manual.
Status	Indicates whether the tunable dispersion compensator (TDC) is in the acquiring state or locked state. The status is invalid if there is a major alarm.
Dispersion Setting	Indicates a value between –700 and +700 packets per second (pps). The dispersion setting is read from the optics module after the tunable dispersion compensator (TDC) has locked.
Reroute Control	Not used.
Reroute BER	Not used.

See [Table 16: show controllers dwdm optics Command Output Field Descriptions](#), on page 237 for a description of the optics fields.

The following example shows the output from the show controllers dwdm command with the **g709 registers** keywords:

```
RP/0/RP0/CPU0:router# show controller dwdm 0/3/0/0 g709 registers
```

```

Addr          Name          Value
0x00800030    Serial[0]      0x30303130
0x00800034    Serial[1]      0x30353934
0x00800038    Serial[2]      0x0
0x0080003c    PartNum[0]     0x38303030
0x00800040    PartNum[1]     0x3034312d
0x00800044    PartNum[2]     0x30300010
0x00800048    PartNum[3]     0x0
0x0080004c    Version[0]     0x312e3041
0x00800050    Version[1]     0x6c706861
0x00800054    Version[2]     0x28423133
0x00800058    Version[3]     0x35290000
0x0080005c    Version[4]     0x0
0x00800060    Version[5]     0x0
0x0080002c    Band           0x0
0x0080001c    RefClock       0x0
0x00800020    Loopback       0x0
0x00800000    IntfStatus     0x5000000
0x00800004    ModEnable      0x1
0x0080000c    ModStatus      0x34010000
0x00800010    ModIntrMask    0x7c000000
0x00800014    ModIntr        0x0
0x00800100    TxLineStat     0x80
0x00800104    TxLineEvent    0x0
0x00800108    TxLineIntrMask 0xc1
0x00800114    TxOpticChan    0x1
0x00800118    Wavelength     0x1753c5
0x00800200    RxLineStat     0x8000
0x00800208    RxLineEventMask 0xffe3
0x00800204    RxLineEvent    0x0

```


The following example shows the output from the **show controllers dwdm** command with the **optics** keyword on a 10-GE PLIM:

```
RP/0/RP0/CPU0:router# show controller dwdm 0/3/0/0 optics
```

Optics Status

```
    Optics Type: 10Gb MSA WDM (65km)
    Clock Source: Internal
    Wavelength Band: C-Band, MSA ITU Channel = 3, Frequency = 196.00 THz,
Wavelength = 1529.553 nm
    TX Power = 3.79 dBm
    RX Power = -8.83 dBm
```

```
RP/0/RP0/CPU0:router# show controllers dwdm 0/2/0/0 optics
```

```
Mon Jul 12 21:04:29.254 UTC
```

Optics Status

```
    Optics Type: 10GBASE-ZR,
Wavelength Info: C-Band, MSA ITU Channel= N/A, Frequency=192THz, Wavelength=1558nm

    TX Power = 1.50 dBm
    RX Power = -11.86 dBm
```

This table describes selected fields from the **show controllers dwdm** command output with the **optics** keyword.

Table 16: show controllers dwdm optics Command Output Field Descriptions

Field	Description
Optics Type	Indicates the optics type: GE or OC-768c/STM-256c DWDM.
Clock Source	Indicates whether the clock is internal or line.
Wavelength Band	Indicates the wavelength band: C-band or L-band.
MSA ITU Channel	Multi Source Agreement (MSA) ITU channel number.
Frequency	Frequency of the channel in terahertz.
Wavelength	Wavelength corresponding to the channel number in nanometers.
TX power	Value of the transmit power level. This is user configurable on the OC-768c/STM-256c DWDM PLIM using the transmit-power command.
RX Power	Actual optical power at the RX port.
RX LOS Threshold	Receive loss of signal threshold. This is user configurable on the OC-768c/STM-256c DWDM PLIM using the rx-los-threshold command. If the receive optical power is less than or equal to this defined threshold, the optical LOS alarm is raised.

The following example shows sample output from the **show controllers dwdm** command with the **wavelength-map** keyword on a Gigabit Ethernet controller:

```
RP/0/RP0/CPU0:router# show controller dwdm 0/5/0/3 wavelength-map
```

Wavelength band: C-band

MSA ITU channel range supported: 3~84

Wavelength map table

Channel Num	Frequency (THz)	Wavelength (nm)
03	196.00	1529.553
04	195.95	1529.944
05	195.90	1530.334
06	195.85	1530.725
07	195.80	1531.116
08	195.75	1531.507
09	195.70	1531.898
10	195.65	1532.290
11	195.60	1532.681
12	195.55	1533.073
13	195.50	1533.465
14	195.45	1533.858
15	195.40	1534.250
16	195.35	1534.643
17	195.30	1535.036
18	195.25	1535.429
19	195.20	1535.822
.		
.		
.		

This table describes selected fields from the **show controllers dwdm** command output with the **wavelength-map** keyword.

Table 17: show controllers dwdm wavelength Command Output Field Descriptions

Field	Description
channel Num	Channel number.
frequency (THz)	Frequency of the wavelength in terahertz.
wavelength (nm)	Wavelength in nanometers.

Related Commands

Command	Description
admin-state, on page 171	Configures the transport administration state on a DWDM port.
rx-los-threshold, on page 228	Configures the transponder receive power threshold on a DWDM controller.
show controller dwdm pm, on page 240	Displays performance monitoring information for a DWDM controller.
transmit-power, on page 246	Configures the DWDM optics transmit laser power on a DWDM controller.

show controller dwdm pm

To display performance monitoring information for a DWDM controller, use the **show controller dwdm pm** command in EXEC mode.

show controller dwdm *instance* **pm history** [**15-min**|**24-hour**|**fec**|**optics**|**otn**]

show controller dwdm *instance* **pm interval** [**15-min**|**24-hour**][**fec**|**optics**|**otn**] *index*

Syntax Description

<i>instance</i>	Physical interface instance. Naming notation is <i>rack/slot/module/port</i> and a slash between values is required as part of the notation. • <i>rack</i>: Chassis number of the rack. • <i>slot</i>: Physical slot number of the line card. • <i>module</i>: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number. • <i>port</i>: Physical port number of the interface. For more information about the syntax for the router, use the question mark (?) online help function.
history	Displays all performance monitoring data.
interval	Displays specific performance monitoring data in a particular interval.
15-min	Displays performance monitoring data in a 15-minute interval.
24-hour	Displays performance monitoring data in a 24-hour interval.
fec	Displays FEC performance parameters, such as bit errors corrected (BIEC) and uncorrectable words.
optics	Displays optics performance parameters, such as optical power.
otn	Displays OTN performance parameters, such as path monitoring failure counts (FC-PM) and section monitoring unavailable seconds (UAS-SM).
index	Interval for which to display the performance monitoring information.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
dwdm	read
interface	read
sonet-sdh	read

Examples

The following example shows the output from the **show controllers dwdm pm** command on a 10-GE DWDM PLIM:

```
RP/0/RP1/CPU0:Router# show controllers dwdm 0/2/0/0 pm interval 24-hour 0
```

```
g709 OTN in the current interval [00:00:00 - 08:05:58 Tue Jul 11 2006]
```

```

ES-SM-NE      : 0          Threshold : -1          TCA(enable)  : NO
ESR-SM-NE     : 0          Threshold : -1          TCA(enable)  : NO
SES-SM-NE     : 0          Threshold : -1          TCA(enable)  : NO
SESR-SM-NE    : 0          Threshold : -1          TCA(enable)  : NO
UAS-SM-NE     : 0          Threshold : -1          TCA(enable)  : NO
BBE-SM-NE     : 0          Threshold : -1          TCA(enable)  : NO
BBER-SM-NE    : 0          Threshold : -1          TCA(enable)  : NO
FC-SM-NE      : 0          Threshold : -1          TCA(enable)  : NO
ES-PM-NE      : 0          Threshold : -1          TCA(enable)  : NO
ESR-PM-NE     : 0          Threshold : -1          TCA(enable)  : NO
SES-PM-NE     : 0          Threshold : -1          TCA(enable)  : NO
SESR-PM-NE    : 0          Threshold : -1          TCA(enable)  : NO
UAS-PM-NE     : 0          Threshold : -1          TCA(enable)  : NO
BBE-PM-NE     : 0          Threshold : -1          TCA(enable)  : NO
BBER-PM-NE    : 0          Threshold : -1          TCA(enable)  : NO
FC-PM-NE      : 0          Threshold : -1          TCA(enable)  : NO
ES-SM-FE      : 0          Threshold : -1          TCA(enable)  : NO
ESR-SM-FE     : 0          Threshold : -1          TCA(enable)  : NO
SES-SM-FE     : 0          Threshold : -1          TCA(enable)  : NO
SESR-SM-FE    : 0          Threshold : -1          TCA(enable)  : NO
UAS-SM-FE     : 106        Threshold : -1          TCA(enable)  : NO
BBE-SM-FE     : 0          Threshold : -1          TCA(enable)  : NO
BBER-SM-FE    : 0          Threshold : -1          TCA(enable)  : NO
FC-SM-FE      : 0          Threshold : -1          TCA(enable)  : NO
ES-PM-FE      : 0          Threshold : -1          TCA(enable)  : NO
ESR-PM-FE     : 0          Threshold : -1          TCA(enable)  : NO
SES-PM-FE     : 0          Threshold : -1          TCA(enable)  : NO
SESR-PM-FE    : 0          Threshold : -1          TCA(enable)  : NO
UAS-PM-FE     : 32327      Threshold : -1          TCA(enable)  : NO
BBE-PM-FE     : 0          Threshold : -1          TCA(enable)  : NO
BBER-PM-FE    : 0          Threshold : -1          TCA(enable)  : NO
FC-PM-FE      : 0          Threshold : -1          TCA(enable)  : NO

```

```

g709 FEC in the current interval [00:00:00 - 08:05:58 Tue Jul 11 2006]
  EC-BITS   : 0                Threshold : 0                TCA(enable) : NO
  UC-WORDS  : 0                Threshold : 0                TCA(enable) : NO

Optics in the current interval [00:00:00 - 08:05:58 Tue Jul 11 2006]
      MIN      AVG      MAX  Threshold  TCA  Threshold  TCA
      (min)    (enable) (max)  (min)    (enable) (max)  (enable)
LBC[mA ] : 1163    4336    8487    -1        NO    -1        NO
OPT[uW]  : 2593    2593    2593    -1        NO    -1        NO
OPR[uW]  : 69      69      70      -1        NO    -1        NO

```

This table describes selected fields from the **show controllers dwdm pm** command output.

Table 18: show controllers dwdm pm Command Output Field Descriptions

Field	Description
EC-BITS	Bit errors corrected (BIEC). Indicates the number of bit errors corrected in the DWDM trunk line during the performance monitoring time interval.
UC-WORDS	Uncorrectable words. This is the number of uncorrectable words detected in the DWDM trunk line during the performance monitoring time interval.
LBC	Laser bias current.
OPR	Optical power on the unidirectional port.
OPT	Transmit optical power in dBm.
MAX	Indicates the maximum value of the parameter.
AVG	Indicates the average value of the parameter
MIN	Indicates the minimum value of the parameter.
THRESHOLD	Indicates the parameter's configured threshold.
TCA	Indicates if TCA reporting is enabled or not.
BBE-PM-FE	Far-end path monitoring background block errors (BBE-PM)—Indicates the number of background block errors recorded in the optical transport network (OTN) path during the performance monitoring time interval.
BBE-PM-NE	Near-end path monitoring background block errors (BBE-PM).
BBE-SM-FE	Far-end section monitoring background block errors (BBE-SM)—Indicates the number of background block errors recorded in the OTN section during the performance monitoring time interval.

Field	Description
BBE-SM-NE	Near-end section monitoring background block errors (BBE-SM).
BBER-PM-FE	Far-end path monitoring background block errors ratio (BBER-PM)—Indicates the background block errors ratio recorded in the OTN path during the performance monitoring time interval.
BBER-PM-NE	Near-end path monitoring background block errors ratio (BBER-PM).
BBER-SM-FE	Far-end section monitoring background block errors ratio (BBER-SM)—Indicates the background block errors ratio recorded in the OTN section during the performance monitoring time interval.
BBER-SM-NE	Near-end section monitoring background block errors ratio (BBER-SM).
ES-PM-FE	Far-end path monitoring errored seconds (ES-PM)—Indicates the errored seconds recorded in the OTN path during the performance monitoring time interval.
ES-PM-NE	Near-end path monitoring errored seconds (ES-PM).
ES-SM-FE	Far-end section monitoring errored seconds (ES-SM)—Indicates the errored seconds recorded in the OTN section during the performance monitoring time interval.
ES-SM-NE	Near-end section monitoring errored seconds (ES-SM).
ESR-PM-FE	Far-end path monitoring errored seconds ratio (ESR-PM)—Indicates the errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
ESR-PM-NE	Near-end path monitoring errored seconds ratio (ESR-PM).
ESR-SM-FE	Far-end section monitoring errored seconds ratio (ESR-SM)—Indicates the errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
ESR-SM-NE	Near-end section monitoring errored seconds ratio (ESR-SM).

Field	Description
FC-PM-FE	Far-end path monitoring failure counts (FC-PM)—Indicates the failure counts recorded in the OTN path during the performance monitoring time interval.
FC-PM-NE	Near-end path monitoring failure counts (FC-PM).
FC-SM-FE	Far-end section monitoring failure counts (FC-SM)—Indicates the failure counts recorded in the OTN section during the performance monitoring time interval.
FC-SM-NE	Near-end section monitoring failure counts (FC-SM).
SES-PM-FE	Far-end path monitoring severely errored seconds (SES-PM)—Indicates the severely errored seconds recorded in the OTN path during the performance monitoring time interval.
SES-PM-NE	Near-end path monitoring severely errored seconds (SES-PM).
SES-SM-FE	Far-end section monitoring severely errored seconds (SES-SM)—Indicates the severely errored seconds recorded in the OTN section during the performance monitoring time interval.
SES-SM-NE	Near-end section monitoring severely errored seconds (SES-SM).
SESR-PM-FE	Far-end path monitoring severely errored seconds ratio (SESR-PM)—Indicates the severely errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
SESR-PM-NE	Near-end path monitoring severely errored seconds ratio (SESR-PM).
SESR-SM-FE	Far-end section monitoring severely errored seconds ratio (SESR-SM)—Indicates the severely errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
SESR-SM-NE	Near-end section monitoring severely errored seconds ratio (SESR-SM).

Field	Description
UAS-PM-FE	Far-end path monitoring unavailable seconds (UAS-PM)—Indicates the unavailable seconds recorded in the OTN path during the performance monitoring time interval.
UAS-PM-NE	Near-end path monitoring unavailable seconds (UAS-PM).
UAS-SM-FE	Far-end section monitoring unavailable seconds (UAS-SM)—Indicates the unavailable seconds recorded in the OTN section during the performance monitoring time interval.
UAS-SM-NE	Near-end section monitoring unavailable seconds (UAS-SM).

transmit-power

To configure the DWDM optics transmit laser power on a DWDM controller, use the **transmit-power** command in DWDM configuration mode. To return the transponder transmit power to its default value, use the **no** form of this command.

transmit-power power-level

no transmit-power power-level

Syntax Description

<i>power-level</i>	Transmit power level in units of 0.1 dBm. Values can range from -190 to +10, which corresponds to a power level range of -19 dBm to +1 dBm.

Command Default

power-level: 0 dBm

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced on the OC-768c/STM-256c DWDM PLIM.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The controller must be in the shutdown state before you can use the **transmit-power** command. You can configure the transponder transmit power only on the OC-768c/STM-256c DWDM PLIM.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the receive power threshold to -10 dBm:

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0/CPU0:router(config-dwdm)# transmit-power -100
```

Related Commands

Command	Description
rx-loss-threshold , on page 228	Configures the transponder receive power threshold on a DWDM controller.
show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

wavelength

To set the wavelength on a DWDM controller to a specific ITU channel or to define a specific frequency or wavelength to a DWDM controller, use the **wavelength** command in DWDM configuration mode. To return the wavelength to its default value, use the **no** form of this command.

{**wavelength** **channel-number**| **frequency**| **update**}

{**no wavelength** **channel-number**| **frequency**| **update**}

Syntax Description

channel-number	(Optional) ITU channel number. ITU channel numbers have predefined frequencies as defined by Multi Source Agreement (MSA) International Telecommunication Union (ITU) grid. • The range is 1 to 89 for conventional band (C-band) • The range is 106 to 185 for long band (L-band).
frequency	(Optional) Keyword that specifies the frequency for the DWDM controller. Enter the 5-digit frequency value in the range of 19170 to 19610 GHz. For example, enter frequency 19580 to specify 195.8 THz.
update	(Optional) Keyword that defines a specific wavelength for the DWDM controller. Enter the 7-digit frequency value in the range of 1528773-1563863 micrometers (mm). For example, enter update 1532290 to specify 1532.29 nanometers (nm).

Command Default

The default for OC-768c/STM-256c DWDM PLIM, C-band is 1.
The default for 10-GE PLIM, C-band is 3.
The default for 10-GE PLIM, L-band is 106.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

You can set the wavelength to a specific ITU channel, that is represented by a channel number in the Multi Source Agreement (MSA) ITU grid.

- The default channel number for the 10-GE PLIM, C-band is 3, which corresponds to a frequency of 196.00 THz and wavelength of 1529.553 nm.
- The default channel number for the 10-GE PLIM, L-band is 106, which corresponds to a frequency of 190.85 THz and wavelength of 1570.83 nm.
- The default channel number for the OC-768c/STM-256c DWDM PLIM, C-band is 1, which corresponds to a frequency of 196.10 and a wavelength of 1528.773.

The spacing between wavelengths is 50 GHZ. Use the **show controllers dwdm** command with the **wavelength-map** keyword to view the channel numbers and wavelengths that are supported for a particular controller.

The controller must be in the shutdown state before you can use the **wavelength** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to set the DWDM wavelength to ITU channel 10.

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# wavelength 10
```

The following example shows how to set the frequency of ITU channel 10 to 195.8 THz.

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# wavelength 10 frequency 19580
```

The following example shows how to set the wavelength of ITU channel 10 to 1532.29 nm.

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# wavelength 10 update 1532290
```

Related Commands

Command	Description
show controller dwdm , on page 230	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

 wavelength



Diagnostics Commands on the Cisco IOS XR Software

This module provides command line interface (CLI) commands for configuring diagnostics on your router.

- [diagnostic load, page 252](#)
- [diagnostic monitor, page 254](#)
- [diagnostic monitor interval, page 256](#)
- [diagnostic monitor syslog, page 258](#)
- [diagnostic monitor threshold, page 259](#)
- [diagnostic ondemand action-on-failure, page 261](#)
- [diagnostic ondemand iterations, page 263](#)
- [diagnostic schedule, page 264](#)
- [diagnostic start, page 267](#)
- [diagnostic stop, page 269](#)
- [diagnostic unload, page 271](#)
- [ping \(administration EXEC\), page 273](#)
- [show diag , page 278](#)
- [show diagnostic bootup level, page 283](#)
- [show diagnostic content, page 285](#)
- [show diagnostic ondemand settings, page 288](#)
- [show diagnostic result, page 289](#)
- [show diagnostic schedule, page 292](#)
- [show diagnostic status, page 294](#)
- [show run diagnostic monitor, page 296](#)

diagnostic load

To load an offline diagnostic image for integrated field diagnostics, use the **diagnostic load** command in administration EXEC mode.

diagnostic load location *node-id* [**autostart** {**all**|**basic**}]

Syntax Description

location <i>node-id</i>	Loads an offline diagnostic image for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation. All modules in the specified slot are loaded with the offline diagnostic image.
autostart { all basic }	(Optional) Starts running the diagnostic tests after the image has loaded. The following options are available: • all—Runs all tests. • basic—Runs basic tests

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic load** command to load an offline diagnostic image used for integrated field diagnostics. Loading a diagnostic image places the specified card out of service.

The time it takes to load a diagnostic image varies depending on the card. Use the **show platform** command to determine if the image has been loaded and if the card has been placed out of service.



Note

The distributed route processor (DRP) does not support the automatic running of tests when the image is loaded for CPU0 and CPU1. After the diagnostic image is loaded, use the **diagnostic start location** *node-id* **test** {*id* | **all** | **basic** | **non-disruptive**} command to execute the tests.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID

Task ID	Operations
diag	execute

Examples

The following example shows how to load an offline diagnostic image:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# diagnostic load location 0/0/CPU0 autostart basic

diagnostic load will bring requested slot out of service. [confirm(y/n)] y
User has confirmed diagnostic load request
Preparing UUT for Diagnostics software.
Downloading IDS diagnostics image /pkg/ucode/hfr-diag-l3sp-fdiags
Downloading IDS diagnostics image /pkg/ucode/hfr-diag-l3-fdiags
Please wait for UUT image downloading ...
diagnostic load in progress.
```

Related Commands

Command	Description
show platform	Displays information and status of each node in the system.

diagnostic monitor

To configure the health-monitoring diagnostic testing for a specified location, use the **diagnostic monitor** command in administration configuration mode. To remove the specified command from the configuration file and restore the system to its default condition, use the **no** form of this command.

diagnostic monitor location *node-id* **test** {*id* | *test-name*} [**disable**]

no diagnostic monitor location *node-id* **test** {*id* | *test-name*} [**disable**]

Syntax Description

node-id	Location to enable diagnostic monitoring. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
test { <i>id</i> <i>test-name</i> }	Specifies diagnostic test selection. The following test selections are available: • <i>id</i>—Test ID . • <i>test-name</i>—Name of the test. Use the show diagnostic content command in administration EXEC mode to see a list of test names and their associated IDs.
disable	Disables diagnostic monitoring for a specified location.

Command Default

To view the default value for each test, use the **show diagnostic content** command in administration EXEC mode when the diagnostic image is first installed. The default may be different for each test.

Command Modes

Administration configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic monitor** command to enable or disable health-monitoring diagnostic testing for a specified test at the specified location.

Use the **disable** keyword to disable a health-monitoring diagnostic test that is enabled by default. For example, if test 1 is enabled by default, the **disable** keyword disables the diagnostic test. If the **no** form of the command is used, the test is set to the default condition, which is enabled.

**Note**

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

Task ID

Task ID	Operations
diag	read, write

Examples

The following example shows how to enable health-monitoring diagnostic testing for 0/1/cpu0:

```
RP/0/RP0/CPU0:router(admin-config)# diagnostic monitor location 0/1/cpu0 test 1
```

Related Commands

Command	Description
show diagnostic content, on page 285	Displays test information including test ID, test attributes, and supported coverage test levels for each test and for all components.

diagnostic monitor interval

To configure the health-monitoring diagnostic testing for a specified interval for a specified location, use the **diagnostic monitor interval** command in administration configuration mode. To remove the specified command from the configuration file and restore the system to its default condition, use the **no** form of this command.

diagnostic monitor interval location *node-id* **test** {*id* | *test-name*} *number-of-days* *hour* : *minutes* : *seconds* . *milliseconds*

no diagnostic monitor interval location *node-id* **test** {*id* | *test-name*} *number-of-days* *hour* : *minutes* : *seconds* . *milliseconds*

Syntax Description

location <i>node-id</i>	Specifies a location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
test { <i>id</i> <i>test-name</i> }	Specifies diagnostic test selection. The following test selections are available: • <i>id</i>—Test ID. • <i>test-name</i>—Test name . Use the show diagnostic content command in administration EXEC mode to see a list of test names and their associated IDs.
<i>number-of-days</i> <i>hour:minutes:seconds.milliseconds</i>	Interval between each test run. The <i>number-of-days</i> argument specifies the number of days between testing. The range is from 0 through 20. The <i>hour:minutes:seconds.milliseconds</i> argument specifies the interval, where <i>hour</i> is a number in the range from 0 through 23, <i>minutes</i> is a number in the range from 0 through 59, <i>seconds</i> is a number in the range from 0 through 59, and <i>milliseconds</i> is a number in the range from 0 through 999.

Command Default

To view the default value for each test, use the **show diagnostic content** command in administration EXEC mode when the diagnostic image is first installed. The default may be different for each test.

Command Modes

Administration configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic monitor interval** command to set the health-monitoring interval of a specified test at the specified location. The **no** version of the command resets the interval to the default setting. The **diagnostic monitor** command is used to enable health-monitoring.

**Note**

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

Task ID

Task ID	Operations
diag	read, write

Examples

The following example shows how to set the health-monitoring diagnostic testing at an interval of 1 hour, 2 minutes, 3 seconds, and 4 milliseconds for 0/1/cpu0:

```
RP/0/RP0/CPU0:router(admin-config)# diagnostic monitor interval location 0/1/cpu0 test 1 0
1:2:3.4
```

Related Commands

Command	Description
diagnostic monitor , on page 254	Configures the health-monitoring diagnostic testing for a specified location.
show diagnostic content , on page 285	Displays test information including test ID, test attributes, and supported coverage test levels for each test and for all components.

diagnostic monitor syslog

To enable the generation of a syslog message when any health monitoring test fails, use the **diagnostic monitor syslog** command in administration configuration mode. To remove the specified command from the configuration file and restore the system to its default condition, use the **no** form of this command.

diagnostic monitor syslog

no diagnostic monitor syslog

Syntax Description This command has no keywords or arguments.

Command Default Syslog is disabled.

Command Modes Administration configuration

Command History	Release	Modification
	Release 3.4.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic monitor syslog** command to enable the generation of a syslog message when a health-monitoring test fails.

Task ID	Task ID	Operations
	diag	read, write

Examples The following example shows how to enable the generation of syslog messages:

```
RP/0/RP0/CPU0:router(admin-config)# diagnostic monitor syslog
```

Related Commands	Command	Description
	show diagnostic content , on page 285	Displays test information including test ID, test attributes, and supported coverage test levels for each test and for all components.

diagnostic monitor threshold

To configure the health-monitoring diagnostic testing failure threshold, use the **diagnostic monitor threshold** command in administration configuration mode. To remove the specified command from the configuration file and restore the system to its default condition, use the **no** form of this command.

diagnostic monitor threshold location *node-id* **test** {*id* | *test-name*} **failure count** *failures*

no diagnostic monitor threshold location *node-id* **test** {*id* | *test-name*} **failure count** *failures*

Syntax Description

location <i>node-id</i>	Specifies a location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
test { <i>id</i> <i>test-name</i> }	Specifies diagnostic test selection. The following test selections are available: • <i>id</i>—Test ID. • <i>test-name</i>—Test name . Use the show diagnostic content command in administration EXEC mode to see a list of test names and their associated IDs.
failure count <i>failures</i>	Specifies the number of allowable test failures. Range is 1 to 99.

Command Default

To view the default value for each test, use the **show diagnostic content** command in administration EXEC mode when the diagnostic image is first installed. The default can be different for each test.

Command Modes

Administration configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic monitor threshold** command to specify health-monitoring diagnostic testing failure threshold.



Note

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

Task ID

Task ID	Operations
diag	read, write

Examples

The following example shows how to set the failure threshold to 35 test failures for all tests for 0/1/cpu0:

```
RP/0/RP0/CPU0:router(admin-config)# diagnostic monitor threshold location 0/1/cpu0 test all failure count 35
```

Related Commands

Command	Description
show diagnostic content, on page 285	Displays test information including test ID, test attributes, and supported coverage test levels for each test and for all components.

diagnostic ondemand action-on-failure

To set when to stop test execution for a **diagnostic start** command, use the **diagnostic ondemand action-on-failure** command in administration EXEC mode. This command is used in conjunction with the **diagnostic ondemand iteration** command.

diagnostic ondemand action-on-failure {continue [*failure-count*]} stop}

Syntax Description

continue	Specifies that test execution continues until all iterations are complete, no matter how many failures are encountered.
failure-count	(Optional) Specifies that test execution continues until the number of failures reaches the specified <i>failure-count</i> . Range is 0 to 65534. A <i>failure-count</i> of 0 indicates to not stop execution until all iterations are complete, no matter how many failures are encountered.
stop	Stops execution immediately when the first test failure occurs.

Command Default

failure-count: 0

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.5.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic ondemand action-on-failure** command to specify whether or when to stop test execution if a test fails. This command is used in conjunction with the **diagnostic ondemand iterations** command.

Task ID

Task ID	Operations
diag	execute

Examples

The following example shows how to set the test failure action to stop:

```
RP/0/RP0/CPU0:router(admin)# diagnostic ondemand action-on-failure stop
```

Related Commands

Command	Description
diagnostic ondemand iterations, on page 263	Sets the number of times to repeat execution of the diagnostic test.
diagnostic start, on page 267	Runs a specified diagnostic test.

diagnostic ondemand iterations

To set the number of times to repeat execution of the tests specified by the **diagnostic start** command, use the **diagnostic ondemand iterations** command in administration EXEC mode.

diagnostic ondemand iterations *count*

Syntax Description

<i>count</i>	Number of times to repeat the specified on-demand tests. Range is 1 to 999.

Command Default

count: 1

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.5.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic ondemand iterations** command to specify the number of times the specified on-demand tests run. The on-demand tests are specified using the **diagnostic start** command.

Task ID

Task ID	Operations
diag	execute

Examples

The following example shows how to set the number of iterations to 12:

```
RP/0/RP0/CPU0:router(admin)# diagnostic ondemand iterations 12
```

Related Commands

Command	Description
diagnostic ondemand action-on-failure , on page 261	Sets when to stop test execution for a diagnostic test.
diagnostic start , on page 267	Runs a specified diagnostic test.

diagnostic schedule

To configure a diagnostic schedule, use the **diagnostic schedule** command in administration configuration mode. To disable the diagnostic schedule, use the **no** form of this command.

diagnostic schedule location *node-id* **test** {*id* | *test-name*} **all** | **basic** | **complete** | **minimal** | **non-disruptive** | **per-device**} [**device** *number* | **all**] {**daily** | **on** *month day year* | **weekly** *day-of-week*} *hour:minute*

no diagnostic schedule location *node-id* **test** {*id* | *test-name*} **all** | **basic** | **complete** | **minimal** | **non-disruptive** | **per-device**} [**device** *number* | **all**] {**daily** | **on** *month day year* | **weekly** *day-of-week*} *hour:minute*

Syntax Description

location <i>node-id</i>	Schedules a diagnostic test for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
test	Specifies a specific diagnostic test, or all diagnostic tests.
id	Specifies a test ID or list of test IDs. Use the show diagnostic content command in administration EXEC mode to see a list of test names and their associated IDs. Multiple tests can be listed if separated by semicolons (;) as follows: • <i>x;y-z</i> (for example: 1; 3-4 or 1;3;4)
test-name	Specifies the name of a test. Use the show diagnostic content command in administration EXEC mode to see a list of test names.
all	Specifies all tests.
basic	Specifies the basic on-demand test suite [Attribute = B].
complete	Specifies the complete bootup test suite [Attribute = C].
minimal	Specifies the minimal bootup test suite [Attribute = M].
non-disruptive	Specifies the non-disruptive test suite [Attribute = N].
per-device	Specifies the per-device test suite [Attribute = V].
device <i>number</i> all	Note This string works only with the all, basic, complete, minimal, non-disruptive, and per-device keywords. (Optional) Specifies the devices on which the diagnostic tests should run. The following options are available: • <i>number</i>—Runs tests on one or more devices. The range is 1 through 8. To specify multiple devices, you can use hyphens (-) and semicolons (;); for example, 1; 3-4 or 1;3;4). • all—Runs tests on all devices.
daily	Specifies a daily schedule.

on <i>month day year</i>	Schedules an exact date.
weekly <i>day-of-week</i>	Specifies a weekly schedule with a set day of the week. Enter the name of a day of the week or a number that specifies a day of the week in the range from 0 through 6.
<i>hour:minute</i>	Scheduled start time, where <i>hour</i> is a number in the range from 0 through 23, and <i>minute</i> is a number in the range from 0 through 59.

Command Default No default behavior or values

Command Modes Administration configuration

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

**Note**

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID	Operations
diag	read, write

Examples The following example shows how to schedule all diagnostic tests for location 0/0/CPU0 every day at 12:30 pm:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# configure
RP/0/RP0/CPU0:router(admin-config)# diagnostic schedule location 0/0/CPU0 test all daily 12:30
```

The following example shows how to schedule all bootup tests for device 1 every Sunday at 12:30 pm:

```
RP/0/RP0/CPU0:router# admin
```

```
RP/0/RP0/CPU0:router(admin)# configure  
RP/0/RP0/CPU0:router(admin-config)# diagnostic schedule location 0/0/CPU0 test all daily  
complete device 1 weekly 12:30
```

Related Commands

Command	Description
show diagnostic schedule, on page 292	Displays the current scheduled diagnostic tasks.

diagnostic start

To run a specified diagnostic test, use the **diagnostic start** command in administration EXEC mode.

diagnostic start location *node-id* **test** [*id* | *test-name*] **all** | **basic** | **complete** | **minimal** | **non-disruptive** | **per-device**] [*device number*] **all**]

Syntax Description

location <i>node-id</i>	Runs diagnostic testing for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
test	Specifies a specific diagnostic test, or all diagnostic tests.
id	Test ID or list of test IDs. Use the show diagnostic content command in administration EXEC mode to see a list of test names and their associated IDs. Multiple tests can be listed if separated by semicolons (;) as follows: • <i>x;y-z</i> (for example: 1; 3-4 or 1;3;4)
test-name	Name of the test. Use the show diagnostic content command in administration EXEC mode to see a list of test names.
all	Specifies all tests.
basic	Specifies the basic on-demand test suite [Attribute = B].
complete	Specifies the complete bootup test suite [Attribute = C].
minimal	Specifies the minimal bootup test suite [Attribute = M].
non-disruptive	Specifies the nondisruptive test suite [Attribute = N].
per-device	Specifies the per-device test suite [Attribute = V].
device <i>number</i> all	Note This string works only with the all, basic, complete, minimal, non-disruptive, and per-device keywords. (Optional) Specifies the devices on which the diagnostic tests should start. The following options are available: • <i>number</i>—Start tests on one or more devices. The range is 1 through 8. To specify multiple devices, you can use hyphens (-) and semicolons (;); for example, 1; 3-4 or 1;3;4). • all—Starts tests on all devices.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.5.0	The per-device keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic start** command to run a diagnostic test on a specified card.

**Note**

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, *0/PL1/SP*. PLIM diagnostic tests are supported.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID

Task ID	Operations
diag	execute

Examples

The following example shows how to start a suite of basic diagnostic tests for a specified location:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# diagnostic start location 0/0/CPU0 test basic
```

The following example shows how to start a suite of minimal bootup tests for devices 1 through 7 at the specified location:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# diagnostic start location 0/0/CPU0 test minimal devices 1-7
```

Related Commands

Command	Description
diagnostic stop , on page 269	Stops the diagnostic testing in progress on a node.

diagnostic stop

To stop the diagnostic testing in progress on a node, use the **diagnostic stop** command in administration EXEC mode.

diagnostic stop location *node-id*

Syntax Description

location <i>node-id</i>	Stops diagnostic testing for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic stop** command to stop a diagnostic test on a specified node. The command is used for scheduled tests, a test that is causing errors, or a test that does not finish.



Note

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID

Task ID	Operations
diag	execute

Task ID**Examples**

The following example shows how to stop the diagnostic test process:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# diagnostic stop location 0/0/CPU0
```

Related Commands

Command	Description
diagnostic start , on page 267	Runs a specified diagnostic test.

diagnostic unload

To unload an offline diagnostic image, use the **diagnostic unload** command in administration EXEC mode.

diagnostic unload location *node-id*

Syntax Description

location <i>node-id</i>	Unloads an offline diagnostic image for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation. The diagnostic image is unloaded for all modules in the specified slot.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **diagnostic unload** command to unload an offline diagnostic image used for integrated field diagnostics. Unloading the image returns the specified card to service.

Use the **show platform** command to determine if the card has been placed back into service.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID

Task ID	Operations
diag	execute

Examples

The following example shows how to unload a diagnostic image:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# diagnostic unload location 0/0/CPU0
```

Related Commands

Command	Description
diagnostic load , on page 252	Loads a diagnostic test.
show platform	Displays information and status of each node in the system.

ping (administration EXEC)

To send internal echo messages from one node to another, use the **ping** command in administration EXEC mode.

ping {**control-eth**|**fabric**} {**fgid** *id*|**location** *node-id*} [**count** *pings*] [**debug**] [**interval** *milliseconds*] [**pattern** *random*] [**queue** *priority*] [**retries** *number*] [**size** *payload_size*] [**timeout** *seconds*] [**tlate** *seconds*] [**uc**] [**via-egressq**] [**via-fabricq-1**]

Syntax Description

control-eth	Specifies a control ethernet ping test.
fabric	Specifies a fabric ping test.
fgid <i>id</i>	Specifies that a multicast ping is sent over a fabric to nodes with the fabric group identifier (FGID) of 1024 through 1000000. Nodes that receive the ping respond with a unicast packet.
location <i>node-id</i>	Specifies that a unicast ping is sent a node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
count <i>pings</i>	(Optional) Number of pings to send each time the command is run. The test reports results and statistics after all pings have been sent and received (or timed out). Range is from 0 through 4294967295. The default is 1.
debug	Note This keyword is available only if you specified the fgid keyword. (Optional) Specifies verbose debugging of the multicast ping utility.
interval <i>milliseconds</i>	(Optional) Hold-off time between each ping in milliseconds. Range is from 0 through 4294967295. The total test time is as follows: $(\text{count}-1) * (\text{RTT} + \text{interval}) + \text{RTT}$ RTT = Round Trip Time for the ping.
pattern <i>random</i>	(Optional) Specifies a data pattern for the ping packet payload.
queue <i>priority</i>	Note This keyword is available only if you specified the fgid keyword. (Optional) Specifies the priority of the queue. The priority can be 0 or 1.
retries <i>number</i>	(Optional) Maximum number of times a failed ping transmission is sent before the packet transmission is considered a failure. Range is from 0 through 4294967295. Note Packet transmission failure is usually an indication of a server software transient. In this case, we recommend that you run the ping command again.
size <i>payload_size</i>	(Optional) Specifies the payload size for each ping packet size. Range is from 0 through 4294967295 bytes. The maximum payload size allowed may be limited, depending on the transport type that is used (fabric or control-ethernet).

timeout <i>seconds</i>	(Optional) Specifies the maximum time to wait for response to a ping. Range is from 0 through 4294967295 seconds. If a ping does not receive a response before the configured timeout expires, the ping statistics reflect it as a discrepancy between the “Sent:” and “Rec’d:” packet count, and the test is considered failed. Because of this, we recommend that you do not set the timeout to 0.
tlate <i>seconds</i>	Note This keyword is available only if you specified the fgid keyword. (Optional) Specifies the amount of time to wait for a response to a multicast ping. The amount of time you specify must be less than the value of the timeout keyword. Range is from 0 through 4294967295 seconds.
uc	Note This keyword is available only if you specified the fgid keyword. (Optional) Specifies that unicast pings (instead of multicast pings) are sent to nodes with the specified FGID.
via-egressq	(Optional) Specifies that a unicast or multicast ping packet is routed to the first fabricq ASIC (instance 0); then, to the egressq ASIC, and finally to the destination CPU. By default, a unicast ping is routed to the first fabricq ASIC (instance 0), then to the destination CPU. A multicast ping is routed to the constituent fabricq ASIC instances, then to the destination CPU.
via-fabricq-1	Note This keyword is available if you specified the location keyword, or both the fgid and uc keywords. (Optional) Specifies that a unicast ping is routed to the current fabricq ASIC (instance 1), then to the egressq ASIC, and finally, to the destination CPU. By default, a unicast ping is routed to the first fabricq ASIC (instance 0), then to the destination CPU.

Command Default No default behavior or values

Command Modes Administration EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.6.0	The fgid keyword was added.
Release 3.8.0	The via-egressq and via-fabricq-1 keywords were added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you enter the **ping** command, a ping is sent to the node at the specified location or to nodes with the specified FGID. The received response is compared byte-by-byte to the sent packet. If a ping response is not received before the specified time-out, or if the ping response does not match the transmitted ping, the ping is considered failed.

A node that is unreachable or intermittently working impacts the total run time for the test as follows:

```
(received_packet_count * RTT + lost_packet_count * timeout + (count-1) * interval)
```

Line cards have two fabricq ASICs and an egressq ASIC. From the first fabricq ASIC (instance 0), the CPU can be reached directly or via the egressq ASIC. From the second fabricq ASIC (instance 1), the CPU can be reached only via the egressq ASIC. In other words, no direct packet path exists between instance 1 and the CPU.

The route processor (RP) and distributed route processor (DRP) cards have only one fabricq ASIC per node (CPU) and no egressq ASIC. Therefore, a fabric ping on an RP or DRP destination specified with the **via-egressq** or **via-fabricq-1** keyword fails.

Task ID

Task ID	Operations
diag	execute

Examples

The following example shows sample output from a control-ethernet ping to an SP node in slot 0/0:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# ping control-eth location 0/0/SP count 5

Src node:      529 : 0/RP0/CPU0
Dest node:      0 : 0/0/SP
Local node:     529 : 0/RP0/CPU0
Packet cnt:     5  Packet size: 128  Payload ptn type: default (0)
Hold-off (ms): 300  Time-out(s): 2   Max retries: 5
Destination node has MAC addr 5246.4800.0000

Running CE node ping.
Please wait...
Src: 529:, Dest: 0, Sent: 5, Rec'd: 5, Mismatched: 0
Min/Avg/Max RTT: 0/200/1000
CE node ping succeeded for node: 0
```

The following example shows a fabric ping from the active RP to the active RP. In this example, the ping contains 72 packets of 1 kilobyte each. This command performs a good coverage test of the entire switch fabric:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# ping fabric location 0/RP0/CPU0 count 72 size 1024

Src node:      529 : 0/RP0/CPU0
Dest node:      529 : 0/RP0/CPU0
Local node:     529 : 0/RP0/CPU0
Packet cnt:     72  Packet size: 1024  Payload ptn type: default (0)
```

```
Hold-off (ms): 300 Time-out(s): 2 Max retries: 5
```

```
Running Fabric node ping.
```

```
Please wait...
```

```
Src: 529:, Dest: 529, Sent: 72, Rec'd: 72, Mismatched: 0
```

```
Min/Avg/Max RTT: 3000/3013/4000
```

```
Fabric node ping succeeded for node: 529
```

The following example shows a ping to a control Ethernet node that has a problem or does not exist:

```
RP/0/RP0/CPU0:router# admin
```

```
RP/0/RP0/CPU0:router(admin)# ping control-eth location 0/1/CPU0 count 3
```

```
Src node: 529 : 0/RP0/CPU0
```

```
Dest node: 17 : 0/1/CPU0
```

```
Local node: 529 : 0/RP0/CPU0
```

```
Packet cnt: 3 Packet size: 128 Payload ptn type: default (0)
```

```
Hold-off (ms): 300 Time-out(s): 2 Max retries: 5
```

```
Destination node has MAC addr 5246.4800.0011
```

```
Running CE node ping.
```

```
Please wait...
```

```
Src: 529:, Dest: 17, Sent: 3, Rec'd: 0, Mismatched: 0
```

```
Requested ping failed for node: 17
```

The following example shows how to send a multicast fabric ping to nodes with the FGID of 1024. The node that sent the multicast ping waits 1 second for a response from each node.

```
RP/0/RP0/CPU0:router# admin
```

```
RP/0/RP0/CPU0:router(admin)# ping fabric fgid 1024 tlate 1
```

```
Src node: 513 : 0/RP0/CPU0
```

```
fgid: 1024
```

```
Local node: 513 : 0/RP0/CPU0
```

```
Packet cnt: 1 Packet size: 128 Payload ptn type: default (0)
```

```
Hold-off (ms): 1 Time-out(s): 2 Max retries: 5
```

```
DelayTimeout: 1 Priority: High
```

```
Running Fabric node ping.
```

```
Please wait...
```

```
Multicast (Pinging fgid) ...
```

Node	Sent	Rcv.	Late	Lost
0/1/CPU0 (0x11:17)	1	1	0	0
0/4/CPU0 (0x41:65)	1	1	0	0
0/4/CPU1 (0x42:66)	1	1	0	0
0/6/CPU0 (0x61:97)	1	1	0	0
0/RP0/CPU0 (0x201:513)	1	1	0	0
0/RP1/CPU0 (0x211:529)	1	1	0	0

```
diag_ping: All 6 nodes responded to all 1 pings
```

The following example shows how to send a multicast fabric ping to nodes with the FGID of 1024. The ping packets are routed from the first fabricq ASIC (instance 0) to the destination CPU via the egressq ASIC. The pings to the two line cards (0/1/CPU0 and 0/6/CPU0) succeeded, while the pings to the RPs (0/RP0/CPU0 and 0/RP1/CPU0) and DRPs (0/4/CPU0 and 0/4/CPU1) failed because they do not have an egressq ASIC.

```
RP/0/RP0/CPU0:router# admin
```

```
RP/0/RP0/CPU0:router(admin)# ping fabric fgid 1024 count 10 via-egressq
```

```
Src node: 513 : 0/RP0/CPU0
```

```
fgid: 1024
```

```
Local node: 513 : 0/RP0/CPU0
```

```
Packet cnt: 10 Packet size: 128 Payload ptn type: default (0)
```

```
Hold-off (ms): 1 Time-out(s): 2 Max retries: 5
```

```
DelayTimeout: 1 Priority: High
```

```
Reaching destination CPUs via egressq
```


Running Fabric node ping.
Please wait...

Multicast (Pinging fgid) ...

Node	Sent	Rcv.	Late	Lost
0/1/CPU0 (0x11:17)	10	10	0	0
0/4/CPU0 (0x41:65)	10	0	0	10
0/4/CPU1 (0x42:66)	10	0	0	10
0/6/CPU0 (0x61:97)	10	10	0	0
0/RP0/CPU0 (0x201:513)	10	0	0	10
0/RP1/CPU0 (0x211:529)	10	0	0	10

diag_ping: Out of 6 node(s), 2 node(s) responded to all 10 pings, 4 node(s) hads

The following example shows how to send a unicast ping to nodes with the FGID of 1024. The ping packets are routed from the second fabricq ASIC (instance 1) to the destination CPU via the egressq ASIC. The pings to the two line cards (0/1/CPU0 and 0/6/CPU0) succeeded, while the pings to the RPs (0/RP0/CPU0 and 0/RP1/CPU0) and DRPs (0/4/CPU0 and 0/4/CPU1) failed because they do not have a second fabricq ASIC nor an egressq ASIC.

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# ping fabric fgid 1024 count 10 uc via-fabricq-1
```

```
Src node:      513 : 0/RP0/CPU0
fgid:          1024
Local node:    513 : 0/RP0/CPU0
Packet cnt:    10  Packet size: 128  Payload ptn type: default (0)
Hold-off (ms): 1   Time-out(s): 2   Max retries: 5
DelayTimeout: 1   Priority:      High
Using other fabricq instance
```

Running Fabric node ping.
Please wait...

Multicast (Pinging Individual Sponge Ids) ...

Node	Sent	Rcv.	Late	Lost
0/1/CPU0 (0x11:17)	10	10	0	0
0/4/CPU0 (0x41:65)	10	0	0	10
0/4/CPU1 (0x42:66)	10	0	0	10
0/6/CPU0 (0x61:97)	10	10	0	0
0/RP0/CPU0 (0x201:513)	10	0	0	10
0/RP1/CPU0 (0x211:529)	10	0	0	10

diag_ping: Out of 6 node(s), 2 node(s) responded to all 10 pings, 4 node(s) hads

show diag

To display details about the hardware and software on each node in a router, use the **show diag** command in the appropriate mode.

EXEC Mode

show diag [*node-id*] [**details** | **eprom-info** | **power-regs** | **summary**]

Administration EXEC Mode

show diag [*node-id*] [**chassis** | **fans** | **power-supply**] [**details** | **eprom-info** | **power-regs** | **summary**]

Syntax Description

summary	(Optional) Displays a summary of the installed hardware.
node-id	(Optional) Identifies the node for which you want to display information. The <i>node-id</i> argument is expressed in the <i>rack/slot/module</i> notation.
eprom-info	(Optional) Displays EEPROM information for the specified node or component (chassis, fan, or power supply).
power-regs	(Optional) Displays power register information for the specified node.
chassis	(Optional) Displays information about the chassis.
fans	(Optional) Displays information about the fan trays.
power-supply	(Optional) Displays information about the power supply.

Command Default

Hardware and software information for all nodes installed in the router is displayed

Command Modes

EXEC
Administration EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	Command output was modified to display the last diagnostic result for a card.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **show diag** command displays detailed information on the hardware components for each node, and on the status of the software running on each node.

Task ID

Task ID	Operations
sysmgr	read

Examples

The following example shows excerpts of output from the **show diag details** command:

```
RP/0/RP0/CPU0:router# show diag details

CARD 0/1/* : Cisco CRS-1 Series Modular Services Card
MAIN: board type 500060
800-25021-05 rev B0
dev 079239
S/N SAD0925050J
PCA: 73-7648-08 rev B0
PID: CRS-MS
VID: V02
CLEI: IPUCAC1BAA
ECI: 132502
RMA: Test Hist: ab, RMA#: 00-00-00, RMA Hist: 00
DIAGNOSTICS RESULTS:
ENTRY 1: 0
TIMESTAMP: 00/00/0000 00:00:00
VERSION: v0.0
PARAM1: 0 PARAM2: n/a
TESTNUM: 0
RESULT: 0 (PASS)
ERRCODE: 0
ENTRY 2: 0
TIMESTAMP: 00/00/0000 00:00:00
VERSION: v0.0
PARAM1: 0 PARAM2: n/a
TESTNUM: 0
RESULT: 0 (PASS)
ERRCODE: 0
ENTRY 3: 0
TIMESTAMP: 00/00/0000 00:00:00
VERSION: v0.0
PARAM1: 0 PARAM2: n/a
TESTNUM: 0
RESULT: 0 (PASS)
ERRCODE: 0
PLIM 0/PL1/* : Cisco Carrier Routing System SPA Interface Processor Card
MAIN: board type 580070
800-23819-03 rev C0
dev N/A
S/N SAD09410538
PCA: 73-8982-06 rev C0
PID: CRS1-SIP-800
VID: V01
CLEI: COUIAAMCAA
ECI: 134912
RMA: Test Hist: ab, RMA#: 00-00-00, RMA Hist: 00
DIAGNOSTICS RESULTS:
```

```

ENTRY 1: 0
TIMESTAMP: 00/00/0000 00:00:00
VERSION: v0.0
PARAM1: 0 PARAM2: n/a
TESTNUM: 0
RESULT: 0 (PASS)
ERRCODE: 0
ENTRY 2: 0
TIMESTAMP: 00/00/0000 00:00:00
VERSION: v0.0
PARAM1: 0 PARAM2: n/a
TESTNUM: 0
RESULT: 0 (PASS)
ERRCODE: 0
ENTRY 3: 0
TIMESTAMP: 00/00/0000 00:00:00
VERSION: v0.0
PARAM1: 0 PARAM2: n/a
TESTNUM: 0
RESULT: 0 (PASS)
ERRCODE: 0
Interface port config: 0 Ports
Optical reach type: Unknown
Connector type: MT-P
NODE 0/1/CPU0
Node State : IOS XR RUN
PLD: Motherboard: 0x0025, Processor: 0xda13, Power: N/A
MONLIB: QNXFFS Monlib Version 3.1
ROMMON: Version 1.51(20080807:092259) [CRS-1 ROMMON]
CPU0: ASMP, CPU1: N/A
SPEED: OSC Speed: 100 Mhz, CPU Speed: 800 Mhz
BUS Speed: 100 Mhz, MEM Speed: 100 Mhz
MEM Size: 1024 Mbytes
SPA 0/1/0 : 4-port OC3/STM1 POS Shared Port Adapter
MAIN: board type 0440
68-2169-01 rev C0
dev N/A
S/N JAB093305VC
PCA: 73-9313-04 rev B0
PID: SPA-4XOC3-POS
VID: V01
CLEI: IPU1AFNRRA
Node State : OK
...

```

The output displayed for the **show diag details** command is the most comprehensive output displayed for **show diag** command variations. All other variations show a subset of the fields displayed except for the **show diag chassis**, **show diag fans**, and **show diag power-supply** commands, which also enable you to display EEPROM information.

```

Rack 0 - Cisco CRS-1 Series 8 Slots Line Card Chassis
00: 03 00 01 E4 43 52 53 2D 38 2D 4C 43 43 00 00 00 ....CRS-8-LCC...
10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
20: 49 50 4D 45 5A 31 30 42 52 41 06 CF B3 00 00 00 IPMEZ10BRA.....
30: 00 00 00 00 00 00 00 00 15 63 58 B9 00 08 00 00 .....CX.....
40: 00 49 00 21 F8 03 50 03 20 00 5A E7 04 78 00 01 .I.!..P..Z..x..
50: 54 42 41 30 39 33 36 30 30 39 30 00 00 00 00 00 TBA09360090.....
60: 01 2B DB 00 00 00 00 00 00 00 00 00 00 00 00 00 .+.....
70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
80: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
90: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 43 49 53 .....CIS
D0: 43 4F 20 53 59 53 54 45 4D 53 2C 20 49 4E 43 2E CO SYSTEMS, INC.
E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....

```

This table describes the significant fields shown in the display.

Table 19: show diag Field Descriptions

Field	Description
MAIN	Provides the following general information about the hardware: • Board type • Revision • Device identifier • Serial number
PCA	Cisco printed circuit assembly (PCA) hardware and revision number.
PID	Displays the product identifier (PID) revision for the specified node.
VID	Displays the version identifier (VID) for the specified node.
CLEI	Displays the common language equipment identifier (CLEI) for the specified node.
ECI	Displays the equipment catalog item (ECI) for the specified node.
Board State	Displays the current software on the board and whether or not the board is running.
PLD	Displays the information about the following programmable logic device (PLD) components on the current module: • Processor • Power • MONLIB
SPEED	Displays speed information for the various components of the specified node, in megahertz.
MEM Size	Displays the memory size of the specified node, in megabytes.
RMA	Displays returned material adjustment (RMA) information for the specified node.

Field	Description
DIAGNOSTICS RESULTS	Provides the following information about the last diagnostics test that was run on the specified node: • ENTRY 1 • TIMESTAMP—Time stamp for the last diagnostic test that was run on the node. • VERSION • PARAM1 • PARAM2 • TESTNUM—Identifies the test that was run on the node. • RESULT—Displays whether the last diagnostic test passed or failed. • ERRCODE

The following example shows how to display EEPROM information:

```
RP/0/RP0/CPU0:router(admin)# show diag chassis eeprom-info
```

```
Rack 0 - Cisco CRS-1 Series 8 Slots Line Card Chassis
00: 03 00 01 E4 43 52 53 2D 38 2D 4C 43 43 00 00 00 ....CRS-8-LCC...
10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
20: 49 50 4D 45 5A 31 30 42 52 41 06 CF B3 00 00 00 IPMEZ10BRA.....
30: 00 00 00 00 00 00 00 00 15 63 58 B9 00 08 00 00 .....cX.....
40: 00 49 00 21 F8 03 50 03 20 00 5A E7 04 78 00 01 .I.!..P. .Z..x..
50: 54 42 41 30 39 33 36 30 30 39 30 00 00 00 00 00 TBA09360090.....
60: 01 2B DB 00 00 00 00 00 00 00 00 00 00 00 00 00 .+.....
70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
80: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
90: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 43 49 53 .....CIS
D0: 43 4F 20 53 59 53 54 45 4D 53 2C 20 49 4E 43 2E CO SYSTEMS, INC.
E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
```

Related Commands

Command	Description
show platform	Displays information and status for each node in the system.
show version	Displays details on the hardware and software status of the system.

show diagnostic bootup level

To display the current diagnostic bootup level, use the **show diagnostic bootup level** command in administration EXEC mode.

show diagnostic bootup level location *node-id*

Syntax Description

location <i>node-id</i>	Specifies a card. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.4.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show diagnostic bootup level** command to display the current diagnostic bootup level for a specified card.



Note

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

Task ID

Task ID	Operations
diag	read

Examples

The following example shows how to display the current diagnostic bootup level for 0/1/cpu0:

```
RP/0/RP0/CPU0:router(admin)# show diagnostic bootup level location 0/1/cpu0
```

show diagnostic bootup level

Current bootup diagnostic level for LC 0/1/CPU0: **minimal**

Related Commands

Command	Description
diagnostic bootup level	Configures the diagnostic for booting a card.

show diagnostic content

To display test information including test ID, test attributes, and supported coverage test levels for each test and for all components, use the **show diagnostic content** command in administration EXEC mode.

show diagnostic content location *node-id*

Syntax Description

location <i>node-id</i>	Displays the diagnostic content for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show diagnostic content** command to display diagnostic test information for a specific location. The test information includes the supported tests and attributes.



Note

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID

Task ID	Operations
diag	read

Examples

The following example shows how to display the test information for a specified location:

For a route processor:

```
RP/0/RP0/CPU0:router(admin): show diagnostic content
location 0/rp0/cpu0
```

Diagnostics test suite attributes:

M/C/* - Minimal bootup level test / Complete bootup level test / NA

B/* - Basic ondemand test / NA

P/V/* - Per port test / Per device test / NA

D/N/* - Disruptive test / Non-disruptive test / NA

S/* - Only applicable to standby unit / NA

X/* - Not a health monitoring test / NA

F/* - Fixed monitoring interval test / NA

E/* - Always enabled monitoring test / NA

A/I - Monitoring is active / Monitoring is inactive

ID	Test Name	Attributes	Test Interval (day hh:mm:ss.ms)	Thre- shold
1)	ControlEthernetPingTest	*B*N*X**I	001 00:00:00.000	1
2)	SelfPingOverFabric	*B*N*X**I	001 00:00:00.000	1
3)	FabricPingTest	*B*N*X**I	001 00:00:00.000	1
4)	ControlEthernetInactiveLinkTest	*B*NS***I	001 00:00:00.000	1
5)	RommonRevision	*B*N*X**I	001 00:00:00.000	1
6)	FabricDiagnosisTest	*B*NS***I	000 00:02:00.000	1
7)	FilesystemBasicDisk0	*B*N****I	003 00:00:00.000	1
8)	FilesystemBasicDisk1	*B*N****I	003 00:00:00.000	1
9)	FilesystemBasicHarddisk	*B*N****I	003 00:00:00.000	1
10)	ScratchRegisterTest	CBVN****I	001 00:00:00.000	1
11)	FabricMcastTest	*B*NS***I	000 00:02:00.000	1
12)	ControlEthernetIntraSwitchTest	*B*N****I	000 00:00:02.000	3
13)	FabricUcastMcastTest	*B*N****A	000 00:01:00.000	1

```
RP/0/RP0/CPU0:router(admin)# show diagnostic content location 0/1/cpu0
```

Wed Feb 16 09:27:01.424 PST

MSC 0/1/CPU0:

Diagnostics test suite attributes:

M/C/* - Minimal bootup level test / Complete bootup level test / NA

B/* - Basic ondemand test / NA

P/V/* - Per port test / Per device test / NA

D/N/* - Disruptive test / Non-disruptive test / NA

S/* - Only applicable to standby unit / NA

X/* - Not a health monitoring test / NA

F/* - Fixed monitoring interval test / NA

E/* - Always enabled monitoring test / NA

A/I - Monitoring is active / Monitoring is inactive

ID	Test Name	Attributes	Test Interval (day hh:mm:ss.ms)	Thre- shold
1)	ControlEthernetPingTest	*B*N*X**I	001 00:00:00.000	1
2)	SelfPingOverFabric	*B*N*X**I	001 00:00:00.000	1
3)	RommonRevision	*B*N*X**I	001 00:00:00.000	1
4)	ScratchRegisterTest	CBVN****I	001 00:00:00.000	1
5)	TcamFullScanTest	*BVN****I	001 00:00:00.000	1
6)	EgressqMemoryBISTTest	**VD*X**I	001 00:00:00.000	1
7)	IngressqMemoryBISTTest	**VD*X**I	001 00:00:00.000	1
8)	FabricqMemoryBISTTest	**VD*X**I	001 00:00:00.000	1

Table 20: show diagnostic content Field Descriptions, on page 287 describes the significant fields shown in the display.

Table 20: show diagnostic content Field Descriptions

Field	Description
M/C/* - Minimal bootup level test / Complete bootup level test / NA	Minimal bootup test or complete bootup test.
B/* - Basic ondemand test / NA	Basic on-demand test.
P/V/* - Per port test / Per device test / NA	Test is per port or device.
D/N/* - Disruptive test / Non-disruptive test / NA	Test is disruptive or nondisruptive.
S/* - Only applicable to standby unit / NA	Test is available for standby node only.
X/* - Not a health monitoring test / NA	Test is not a health-monitoring test.
F/* - Fixed monitoring interval test / NA	Test is a fixed monitoring interval test.
E/* - Always enabled monitoring test / NA	Test is an always enabled monitoring test.
A/I - Monitoring is active / Monitoring is inactive	Test is active or inactive.
ID	ID of the test.
Test Name	Name of the test.
Attributes	Attributes for the test.
Test Interval	Interval of the test.
Threshold	Failure threshold of the text.

Related Commands

Command	Description
diagnostic bootup level	Configures the diagnostic for booting a card.
diagnostic load, on page 252	Loads an offline diagnostic image for integrated field diagnostics.
diagnostic monitor interval, on page 256	Configures the health-monitoring diagnostic testing for a specified interval for a specified location.
diagnostic schedule, on page 264	Configures a diagnostic schedule.
diagnostic start, on page 267	Runs a specified diagnostic test.
diagnostic unload, on page 271	Unloads an offline diagnostic image.

show diagnostic ondemand settings

To display the current on-demand settings, use the **show diagnostic ondemand settings** command in administration EXEC mode.

show diagnostic ondemand settings

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Administration EXEC

Command History	Release	Modification
	Release 3.5.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	diag	read

Examples The following example shows how to display the on-demand settings:

```
RP/0/RP0/CPU0:router(admin)# show diagnostic ondemand settings
Test iterations = 45
Action on test failure = continue until test failure limit reaches 25
```

show diagnostic result

To display diagnostic test results, use the **show diagnostic result** command in administration EXEC mode.

show diagnostic result location *node-id* [**test** {*id* | *test-name* | **all**}] [**detail**]

Syntax Description

location <i>node-id</i>	Displays the diagnostic test results for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
test { <i>id</i> <i>test-name</i> all }	(Optional) Specifies diagnostic test selection. The following test selections are available: • <i>id</i>—Test ID or list of test IDs . Multiple tests can be listed if separated by semicolons (;) as follows: ◦ x;y-z (for example: 1; 3-4 or 1;3;4) • <i>test-name</i>—Test name. • all—Specifies all tests. Use the show diagnostic content command in administration EXEC mode to see a list of test names and their associated IDs.
detail	(Optional) Specifies detailed results.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show diagnostic result** command to display diagnostic results for a specific location.

**Note**

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID

Task ID	Operations
diag	read

Examples

The following example shows how to display detailed diagnostic test results:

```
RP/0/RP0/CPU0:router(admin)# show diagnostic result location 0/3/CPU0 test 1 detail
```

Test results: (. = Pass, F = Fail, U = Untested)

```
1 ) Control Ethernet Ping Test -----> .
Error code -----> 0 (DIAG_SUCCESS)
Total run count -----> 1
Last test execution time ----> Thu Aug 11 18:13:38.918 2005
First test failure time -----> n/a
Last test failure time -----> n/a
Last test pass time -----> Thu Aug 11 18:13:38.918 2005
Total failure count -----> 0
Consecutive failure count ---> 0
```

Table 21: show diagnostic result Field Descriptions

Field	Description
Test results :	Test result options: • .—Pass • F—Fail • U—Untested
Error code	Code for the error. DIAG_SUCCESS is indicated if there were no code errors. DIAG_FAILURE is indicated for any failure. DIAG_SKIPPED is indicated if the test was stopped.
Total run count	Number of times the test has run.
Last test execution time	Last time the test was run.
First test failure time	First time the test failed.
Last test failure time	Last time the test failed.

Field	Description
Last test pass time	Last time the test passed.
Total failure count	Number of times the test has failed.
Consecutive failure count	Number of consecutive times the test has failed.

Related Commands

Command	Description
diagnostic load, on page 252	Loads an offline diagnostic image for integrated field diagnostics.
diagnostic schedule, on page 264	Configures a diagnostic schedule.
diagnostic start, on page 267	Runs a specified diagnostic test.

show diagnostic schedule

To display the current scheduled diagnostic tasks, use the **show diagnostic schedule** command in administration EXEC mode.

show diagnostic schedule location *node-id*

Syntax Description

location <i>node-id</i>	Displays the diagnostic schedule for a specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show diagnostic schedule** command to display scheduled diagnostic tasks for a specific location.



Note

To specify a physical layer interface module (PLIM) node using the *node-id* argument, use the following notation: *rack/PLslot-number/SP*. For example, 0/PL1/SP. PLIM diagnostic tests are supported.

For more information about running Cisco IOS XR diagnostics, refer to *Cisco IOS XR Diagnostics*.

Task ID

Task ID	Operations
diag	read

Examples

The following example shows how to display scheduled diagnostic tasks:

```
RP/0/RP0/CPU0:router# admin
RP/0/RP0/CPU0:router(admin)# show diagnostic schedule location 0/3/CPU0
```



```
Current Time = Tue Sep 27 12:41:24 2005
Diagnostic for LC 0/3/CPU0:

Schedule #1:
  To be run daily 14:40
  Test ID(s) to be executed: 1 .
```

Table 22: show diagnostic schedule Field Descriptions

Field	Description
Current Time	Current system time.
Diagnostic for	Card for which the diagnostic is scheduled.
Schedule	Schedule number.
To be run	Time at which the diagnostics are scheduled to run.
Test ID(s) to be executed	Tests to be run at scheduled time.

Related Commands

Command	Description
diagnostic schedule , on page 264	Configures a diagnostic schedule.

show diagnostic status

To display the current running tests, use the **show diagnostic status** command in administration EXEC mode.

show diagnostic status

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.5.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
diag	read

Examples

The following example shows how to display the current running tests:

```
RP/0/RP0/CPU0:router(admin)# show diagnostic status

<BU> - Bootup Diagnostics, <HM> - Health Monitoring Diagnostics,
<OD> - OnDemand Diagnostics, <SCHD> - Scheduled Diagnostics
=====
Card Description Current Running Test Run by
-----
RP 0/RP0/CPU0 N/A N/A
-----
RP 0/RP1/CPU0 N/A N/A
-----
DRP 0/4/CPU1 N/A N/A
-----
DRP 0/4/CPU0 SelfPingOverFabric <OD>
DRP-ACC 0/PL4/SP N/A N/A
-----
MSC 0/1/CPU0 N/A N/A
JACKET CARD 0/PL1/SP N/A N/A
-----
```

```
MSC 0/6/CPU0 N/A N/A
JACKET CARD 0/PL6/SP N/A N/A
-----
FC/S 0/SM0/SP N/A N/A
-----
FC/S 0/SM3/SP N/A N/A
-----
FC/S 0/SM2/SP N/A N/A
-----
FC/S 0/SM1/SP N/A N/A
-----
DRP 0/4/SP N/A N/A
-----
MSC 0/1/SP N/A N/A
-----
MSC 0/6/SP N/A N/A
=====
```

show run diagnostic monitor

To display the card type of a line card or a Shared Port Adapter (SPA), use the **show run diagnostic monitor** command in the administration configuration mode.

show run diagnostic monitor

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Administration configuration

Command History	Release	Modification
	Release 3.8.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

You need to be aware of the card type when you configure a slot or swap a card, and the configuration must re-apply. If the card type is different, the configuration does not re-apply. You can display the card type using the **show run diagnostic monitor** command in the administration configuration mode.

Task ID	Task ID	Operations
	diag	read, write

Examples

```
RP/0/RP0/CPU0:router#admin
RP/0/RP0/CPU0:router(admin)# config
RP/0/RP0/CPU0:router(admin-config)# diagnostic monitor location 0/RP1/CPU0 test
FabricDiagnosisTest
RP/0/RP0/CPU0:router(admin-config)# commit
RP/0/RP0/CPU0:router(admin-config)# end
RP/0/RP0/CPU0:router(admin)# show run diagnostic monitor

diagnostic monitor location 0/RP1/CPU0 test FabricDiagnosisTest card-type 100006
```



Ethernet Interface Commands on the Cisco IOS XR Software

This module provides command line interface (CLI) commands for configuring Ethernet interfaces on the Cisco CRS Router.

- [carrier-delay, page 299](#)
- [clear lldp, page 301](#)
- [clear mac-accounting \(Ethernet\), page 303](#)
- [flow-control, page 305](#)
- [interface \(Ethernet\), page 307](#)
- [lldp, page 309](#)
- [lldp \(interface\), page 310](#)
- [lldp holdtime, page 311](#)
- [lldp reinit, page 313](#)
- [lldp timer, page 315](#)
- [lldp tlv-select disable, page 316](#)
- [loopback \(Ethernet\), page 318](#)
- [mac-accounting, page 320](#)
- [mac-address \(Ethernet\), page 322](#)
- [negotiation auto, page 324](#)
- [packet-gap non-standard, page 325](#)
- [show controllers \(Ethernet\), page 327](#)
- [show lldp, page 375](#)
- [show lldp entry, page 377](#)
- [show lldp errors, page 379](#)
- [show lldp interface, page 381](#)

- [show lldp neighbors, page 383](#)
- [show lldp traffic, page 386](#)
- [show mac-accounting \(Ethernet\), page 388](#)

carrier-delay

To delay the processing of hardware link down notifications, use the **carrier-delay** command in interface configuration mode.

carrier-delay {**down** *milliseconds* [**up** *milliseconds*]| **up** *milliseconds* [**down** *milliseconds*]}

Syntax Description

down <i>milliseconds</i>	Length of time, in milliseconds, to delay the processing of hardware link down notifications. Range is from 0 through 65535.
up <i>milliseconds</i>	Length of time, in milliseconds, to delay the processing of hardware link up notifications. Range is from 0 through 65535.

Command Default

No carrier-delay is used, and the upper layer protocols are notified as quickly as possible when a physical link goes down.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.4.0	The msec keyword was replaced by the down keyword, and the value of the <i>milliseconds</i> argument was increased to 0 through 65535. The up keyword was added, and the value of the <i>milliseconds</i> argument was set at 0 through 65535.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you delay the processing of hardware link down notifications, the higher layer routing protocols are unaware of a link until that link is stable.

If the **carrier-delay down milliseconds** command is configured on a physical link that fails and cannot be recovered, link down detection is increased, and it may take longer for the routing protocols to re-route traffic around the failed link.

In the case of very small interface state flaps, running the **carrier-delay down milliseconds** command prevents the routing protocols from experiencing a route flap.

**Note**

Enter the **show interface** command to see the current state of the carrier-delay operation for an interface. No carrier-delay information is displayed if carrier-delay has not been configured on an interface.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to delay the processing of hardware link down notifications:

```
RP/0/RP0/CPU0:router(config-if)# carrier-delay down 10
```

The following example shows how to delay the processing of hardware link up and down notifications:

```
RP/0/RP0/CPU0:router(config-if)# carrier-delay up 100 down 100
```

Related Commands

Command	Description
dampening , on page 618	Turns on event dampening.

clear lldp

To reset Link Layer Discovery Protocol (LLDP) traffic counters or LLDP neighbor information, use the **clear lldp** command in EXEC configuration mode.

clear lldp {counters| table}

Syntax Description

counters	Specifies that LLDP traffic counters are cleared.
table	Specifies that LLDP information in the neighbor table is cleared.

Command Default

LLDP traffic counters are not reset, and LLDP neighbor information is not cleared.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To reset counters from the **show lldp traffic** command, use the **clear lldp counters** command. To clear neighbor information displayed by the **show lldp neighbors** command, use the **clear lldp table** command.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to clear the LLDP counters and display LLDP traffic. The output from the **show lldp traffic** command shows that all the traffic counters have been reset to zero.

```
RP/0/RP0/CPU0:router# clear lldp counters
RP/0/RP0/CPU0:router# show lldp traffic
LLDP traffic statistics:
  Total frames out: 0
  Total entries aged: 0
  Total frames in: 0
  Total frames received in error: 0
  Total frames discarded: 0
```

```
Total TLVs discarded: 0
Total TLVs unrecognized: 0
```

The following example shows how to clear the LLDP table. The output of the **show lldp neighbors** command shows that all information has been deleted from the table.

```
RP/0/RP0/CPU0:router# clear lldp table
RP/0/RP0/CPU0:router# show lldp neighbors
Capability codes:
  (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
  (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Device ID                Local Intf    Hold-time    Capability    Port ID
```

Related Commands

Command	Description
show lldp neighbors, on page 383	Displays information about LLDP neighbors.
show lldp traffic, on page 386	Displays statistics for LLDP traffic.

clear mac-accounting (Ethernet)

To clear Media Access Control (MAC) accounting statistics, use the **clear mac-accounting** command in EXEC mode.

clear mac-accounting {GigabitEthernet| TenGigE} *interface-path-id* [**location** *node-id*]

Syntax Description

{GigabitEthernet TenGigE}	Type of Ethernet interface whose MAC accounting statistics you want to clear. Enter GigabitEthernet , TenGigE .
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>node-id</i>	(Optional) Clears MAC accounting statistics for the designated node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
interface	read, write
basic-services	read, write

Examples

The following example shows how to clear all MAC accounting statistics for the TenGigE port at 1/0/0/1:

```
RP/0/RP0/CPU0:router# clear mac-accounting TenGigE 0/1/5/0 location 1/0/0/1
```

Related Commands

Command	Description
mac-accounting , on page 320	Generates accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces.
show mac-accounting (Ethernet) , on page 388	Displays MAC accounting statistics for an interface.

flow-control

To enable the sending of flow-control pause frames, use the **flow-control** command in interface configuration mode. To disable flow control, use the **no** form of this command.

flow-control {**bidirectional**| **egress**| **ingress**}

no flow-control ingress {**bidirectional**| **egress**| **ingress**}

Syntax Description

bidirectional	Enables flow-control for egress and ingress direction.
egress	Pauses egress traffic if IEEE 802.3x PAUSE frames are received.
ingress	Sends IEEE 802.3x PAUSE frames in case of congestion with ingress traffic.

Command Default

If autonegotiate is enabled on the interface, then the default is negotiated.

If autonegotiate is disabled on the interface, then the sending of flow-control pause frames is disabled for both egress and ingress traffic.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

When you explicitly enable the sending of flow-control pause frames, the value you configured with the **flow-control** command overrides any autonegotiated value. This prevents a link from coming up if the value you set with the **flow-control** command conflicts with the allowable settings on the other end of the connection.



Note

The **flow-control** command is supported on Gigabit Ethernet, TenGigE interfaces only; the **flow-control** command is not supported on Management Ethernet Interfaces.

**Note**

The **flow-control** command syntax options may vary, depending on the type of PLIM or SPA that is installed in your router.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enable the sending of flow-control pause frames for ingress traffic on the TenGigE interface 0/3/0/0:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# flow-control ingress
```

Related Commands

Command	Description
show interfaces, on page 629	Displays statistics for all interfaces configured on the router or for a specific node.

interface (Ethernet)

To specify or create an Ethernet interface and enter interface configuration mode, use the **interface (Ethernet)** command in global configuration mode.

interface {GigabitEthernet| HundredGigE| TenGigE} *interface-path-id*

no interface {GigabitEthernet| HundredGigE| TenGigE} *interface-path-id*

Syntax Description

GigabitEthernet	Specifies or creates a Gigabit Ethernet (1000 Mbps) interface.
HundredGigE	Specifies or creates a Hundred Gigabit Ethernet (100 Gbps) interface.
TenGigE	Specifies or creates a Ten Gigabit Ethernet (10 Gbps) interface.
<i>interface-path-id</i>	Physical interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

None

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	This command was modified. The TenGigE keyword was added.
Release 4.0.1	This command was modified. The HundredGigE keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To specify a physical interface, the notation for the *interface-path-id* is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the line card.
- *module*: Module number. A physical layer interface module (PLIM) is always 0.
- *port*: Physical port number of the interface.

Task ID

Task ID	Operation
interface	read, write

Examples

The following example shows how to enter interface configuration mode for a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/4/0/0
RP/0/RP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
show interfaces, on page 629	Displays statistics for all interfaces configured on the router or for a specific node.

lldp

To enable the Link Layer Discovery Protocol (LLDP) globally for both transmit and receive operation on the system, use the **lldp** command in global configuration mode. To disable LLDP, use the **no** form of this command.

lldp

no lldp

Syntax Description This command has no keywords or arguments.

Command Default LLDP is disabled.

Command Modes Global configuration (config)

Command History	Release	Modification
	Release 4.2.3	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you enable LLDP globally using the **lldp** command, all supported interfaces are enabled for both transmit and receive operation. You can disable either transmit or receive operation for a particular interface using the **lldp (interface)** command.

Task ID	Task ID	Operation
	ethernet-services	read, write

Examples The following example shows how to enable LLDP globally on the router:

```
RP/0/RP0/CPU0:router(config)# lldp
```

Related Commands	Command	Description
	show lldp , on page 375	Displays the global LLDP operational characteristics on the system.

lldp (interface)

To enter LLDP configuration mode, use the **lldp (interface)** command.

lldp

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
ethernet-services	read, write
interface	read, write

Examples

The following example shows how to enter LLDP configuration mode from Ethernet interface configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lldp
RP/0/RP0/CPU0:router(config-lldp)#
```

Related Commands

Command	Description
interface (Ethernet) , on page 307	Specifies or creates an Ethernet interface and enters interface configuration mode.
lldp , on page 309	Enables LLDP globally for both transmit and receive operation on the system.

lldp holdtime

To specify the length of time that information from a Link Layer Discovery Protocol (LLDP) packet should be held by the receiving device before aging and removing it, use the **lldp holdtime** command in global configuration mode. To return to the default, use the **no** form of this command.

lldp holdtime *seconds*

no lldp holdtime *seconds*

Syntax Description

<i>seconds</i>	Number from 0 to 65535 that specifies the amount of time (in seconds) to hold the packet information. The default is 120.

Command Default

The packet hold time is 120 seconds (2 minutes).

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to change the default hold time to 1 minute:

```
RP/0/RP0/CPU0:router(config)# lldp holdtime 60
```

Related Commands

Command	Description
lldp , on page 309	Enables LLDP globally for both transmit and receive operation on the system.

Command	Description
show lldp, on page 375	Displays the global LLDP operational characteristics on the system.

lldp reinit

To specify the length of time to delay initialization of the Link Layer Discovery Protocol (LLDP) on an interface, use the **lldp reinit** command in global configuration mode. To return to the default, use the **no** form of this command.

lldp reinit *seconds*

no lldp reinit *seconds*

Syntax Description

<i>seconds</i>	Number from 2 to 5 that specifies the length of time (in seconds) that LLDP should delay initialization. The default is 2.

Command Default

Initialization of LLDP is delayed for 2 seconds on an interface.

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to change the default initialization delay from 2 to 4 seconds:

```
RP/0/RP0/CPU0:router(config)# lldp reinit 4
```

Related Commands

Command	Description
lldp, on page 309	Enables LLDP globally for both transmit and receive operation on the system.

Command	Description
show lldp, on page 375	Displays the global LLDP operational characteristics on the system.

lldp timer

To specify the Link Layer Discovery Protocol (LLDP) packet rate, use the **lldp timer** command in global configuration mode. To return to the default, use the **no** form of this command.

lldp timer *seconds*

no lldp timer *seconds*

Syntax Description

<i>seconds</i>	Number from 5 to 65534 that specifies the rate (in seconds) at which to send LLDP packets. The default is 30.

Command Default

LLDP packets are sent every 30 seconds.

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to change the default LLDP packet rate from 30 seconds to 1 minute:

```
RP/0/RP0/CPU0:router(config)# lldp timer 60
```

Related Commands

Command	Description
lldp, on page 309	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 375	Displays the global LLDP operational characteristics on the system.

lldp tlv-select disable

To disable transmission of the selected Type Length Value (TLV) in Link Layer Discovery Protocol (LLDP) packets, use the **lld tlv-select disable** command in global configuration mode. To return to the default, use the **no** form of this command.

lldp tlv-select *tlv-name* **disable**

no lldp tlv-select *tlv-name* **disable**

Syntax Description

<i>tlv-name</i>	Name of the TLV to be suppressed from LLDP packets. The <i>tlv-name</i> can be one of the following LLDP TLV types:
	• management-address • port-description • system-capabilities • system-description • system-name

Command Default

All TLVs are sent in LLDP packets.

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Certain TLVs are classified as mandatory in LLDP packets, such as the Chassis ID, Port ID, and Time to Live (TTL) TLVs. These TLVs must be present in every LLDP packet. You can use the **lldp tlv-select disable** command to suppress transmission of certain other optional TLVs in LLDP packets.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to disable transmission of the System Capabilities TLV from LLDP packets:

```
RP/0/RP0/CPU0:router(config)# lldp tlv-select system-capabilities disable
```

Related Commands

Command	Description

loopback (Ethernet)

To configure an Ethernet controller for loopback mode, use the **loopback** command in interface configuration mode. To disable loopback, use the **no** form of this command.

loopback {external| internal| line}

no loopback

Syntax Description

external	All IPv4 self-ping packets are sent out of the interface and looped back externally before being received on the ingress path.
internal	All packets are looped back internally within the router before reaching an external cable.
line	Incoming network packets are looped back through the external cable.

Command Default

Loopback mode is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **loopback** command is available for all Ethernet interface types (Gigabit Ethernet, 10-Gigabit Ethernet).

Two loopback operation modes are supported for diagnostic purposes: internal and line. In the terminal (internal) loopback, the sent signal is looped back to the receiver. In the facility (line) loopback, the signal received from the far end is looped back and sent on the line. The two loopback modes cannot be active at the same time. In normal operation mode, neither of the two loopback modes is enabled.



Tip

Use the **loopback external** command when an external loopback connector is attached to the interface.

Task ID

Task ID	Operations
interface	read, write

Examples

In the following example, all packets are looped back to the TenGigE controller:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/3/0/0  
RP/0/RP0/CPU0:router(config-if)# loopback internal
```

mac-accounting

To generate accounting information for IP traffic based on the source and destination Media Access Control (MAC) addresses on LAN interfaces, use the **mac-accounting** command in interface configuration mode. To disable MAC accounting, use the **no** form of this command.

mac-accounting {egress| ingress}

Syntax Description

egress	Generates accounting information for IP traffic based on the destination MAC addresses (egress direction).
ingress	Generates accounting information for IP traffic based on the source MAC addresses (ingress direction).

Command Default

MAC accounting is disabled

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.0	This command was first introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **mac-accounting** command calculates the total packet and byte counts for a LAN interface that receives or sends IPv4 packets to or from a unique MAC address.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enable MAC accounting for the source MAC address on the ingress direction:

```
RP/0/RP0/CPU0:router(config-if)# mac-accounting ingress
```

Related Commands

Command	Description
clear mac-accounting (Ethernet), on page 303	Clears MAC accounting statistics for an interface.
show mac-accounting (Ethernet), on page 388	Displays MAC accounting statistics for an interface.

mac-address (Ethernet)

To set the MAC layer address of an Ethernet interface, use the **mac-address** command in interface configuration mode. To return the device to its default MAC address, use the **no** form of this command.

mac-address *value1.value2.value3*

no mac-address

Syntax Description

<i>value1.</i>	High 2 bytes of the MAC address in hexadecimal format. Range is from 0 to ffff.
<i>value2.</i>	Middle 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff.
<i>value3</i>	Low 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff.

Command Default

The default MAC address is read from the hardware burned-in address (BIA).

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The MAC address must be in the form of three 4-digit values (12 digits in dotted decimal notation).

The **mac-address** command is available for all types of line card Ethernet interfaces (Gigabit Ethernet, 10-Gigabit Ethernet) and for the Management Ethernet interface.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to set the MAC address of a Gigabit Ethernet interface located at 0/1/5/0:

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/1/5/0
```

```
RP/0/RP0/CPU0:router(config-if)# mac-address 0001.2468.ABCD
```

negotiation auto

To enable link autonegotiation on Gigabit Ethernet interfaces, use the **negotiation auto** command in interface configuration mode. To disable link autonegotiation, use the **no** form of this command.

negotiation auto

no negotiation auto

Syntax Description This command has no keywords or arguments.

Command Default Link autonegotiation is disabled.

Command Modes Interface configuration

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **negotiation auto** command is available on Gigabit Ethernet interfaces only.

Task ID	Operations
interface	read, write

Examples The following example shows how to enable link autonegotiation on an interface:

```
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RP0/CPU0:router(config-if)# negotiation auto
```

The following example shows how to disable link autonegotiation on an interface:

```
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RP0/CPU0:router(config-if)# no negotiation auto
```


packet-gap non-standard

To change the packet interval for traffic on an interface for improved interoperability with Cisco Catalyst 6000 series switches, use the **packet-gap non-standard** command in interface configuration mode. To use the standard packet interval as defined by the IEEE 802.3e specification, use the **no** form of this command.

packet-gap non-standard

no packet-gap non-standard

Syntax Description This command has no keywords or arguments.

Command Default The interface uses the standard packet interval as defined by the IEEE 802.3e specification.

Command Modes Interface configuration

Command History	Release	Modification
	Release 3.0	This command was first introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An interface that is connected to a Cisco Catalyst 6000 series switch may experience packet loss problems that can be resolved by changing the packet interval of traffic from standard (as defined by the IEEE 802.3e specification) to nonstandard using the **packet-gap non-standard** command.



Note The **packet-gap non-standard** command is available on 10-Gigabit Ethernet interfaces only.

Task ID	Task ID	Operations
	interface	read, write

Examples The following example shows how to change the packet interval for traffic on an interface from standard to nonstandard:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/3/0/0
```

packet-gap non-standard

```
RP/0/RP0/CPU0:router(config-if)# packet-gap non-standard
```

show controllers (Ethernet)

To display status and configuration information about the Ethernet interfaces on a specific node, use the **show controllers** command in EXEC mode.

show controllers {GigabitEthernet| HundredGigE| TenGigE} *interface-path-id* [**all**| **bert**| **internal**| **mac**| **phy**| **stats**| **xgxs**]

Syntax Description

{GigabitEthernet HundredGigE TenGigE}	Specifies the type of Ethernet interface whose status and configuration information you want to display. Enter GigabitEthernet, TenGigE, or HundredGigE.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
all	Displays detailed information for the specified interface.
bert	Displays BERT status information for the interface. Note Not supported on the Cisco CRS 14-Port or Cisco CRS 20-Port or 10-Gigabit or 1-Port 100-Gigabit Ethernet LAN/WAN-PHY Interface Module.
internal	Displays internal information for the interface.
mac	Displays mac information for the interface.
phy	Displays physical information for the interface.
stats	Displays statistical information for the interface.
xgxs	Displays information about the 10 Gigabit Ethernet Extended Sublayer (XGXS).

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.0	This command was first introduced.

Release	Modification
Release 3.5.0	This command was modified. The GigabitEthernet and TenGigE keywords were added.
Release 4.0.1	This command was modified. The HundredGigE keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
cisco-support	read
	Note Required in addition to the interface (read) task ID to use the control keyword only.
dwdm	read
interface	read
sonet-sdh	read

Examples

```
RP/0/RP0/CPU0:router# show controllers GigabitEthernet 0/1/0/1
Statistics for interface GigabitEthernet0/1/0/0 (cached values):
Ingress:
  Input total bytes      = 64000
  Input good bytes       = 64000
  Input total packets    = 1000
  Input 802.1Q frames    = 0
  Input pause frames     = 0
  Input pkts 64 bytes    = 1000
  Input pkts 65-127 bytes = 0
  Input pkts 128-255 bytes = 0
  Input pkts 256-511 bytes = 0
  Input pkts 512-1023 bytes = 0
  Input pkts 1024-1518 bytes = 0
```

```

      Input pkts 1519-Max bytes  = 0
      Input good pkts           = 1000
      Input unicast pkts        = 0
      Input multicast pkts       = 1000
      Input broadcast pkts       = 0
      Input drop overrun         = 0
RP/0/RP0/CPU0:router# show controllers GigabitEthernet 0/0/0/1
Operational data for interface GigabitEthernet0/0/0/1:

State:
  Administrative state: enabled
  Operational state: Up
  LED state: Green On

Media:
  Media type: X fiber over short-wl laser PMD, full duplex
  Optics:
    Vendor: CISCO-FINISAR
    Part number: FTLF8519P2BNL-C6
    Serial number: FNS120304T9

MAC address information:
  Operational address: 001d.e5eb.88e1
  Burnt-in address: 001d.e5eb.88e1
  No unicast addresses in filter
  No multicast addresses in filter
Autonegotiation enabled:
  No restricted parameters

Operational values:
  Speed: 1Gbps
  Duplex: Full Duplex
  Flowcontrol: None
  Loopback: None (or external)
  MTU: 1526
  MRU: 1526
  Inter-packet gap: standard (12)

```

The following example shows sample output from the **show controllers TenGigE** command for the Cisco 8-Port 10-Gigabit Ethernet physical layer interface module (PLIM):

```

RP/0/RP0/CPU0:router# show controllers TenGigE 0/3/0/0

PHY:
XENPAK device registers:
=====

Vendor Name: CISCO-SUMITOMO
Vendor PN: SXP3101NV-C1
Vendor Rev: A1
Vendor SN: ECL120701L2

Package OUI: 0041f426
Vendor OUI: 00137b11
Vendor Date Code: 2004071200
nvr_control_status = 0x0007
nvr_version = 0x1e
nvr_size0 = 0x01
nvr_size1 = 0x00
mem_used0 = 0x01
mem_used1 = 0x00
basic_addr = 0x0b
cust_addr = 0x77
vend_addr = 0xa7
ext_vend_addr0 = 0x00
ext_vend_addr1 = 0xff
reserved0 = 0x00
tcvr_type = 0x01
connector = 0x01
encoding = 0x01
bitrate0 = 0x27
bitrate1 = 0x10

```

show controllers (Ethernet)

```

protocol = 0x01
x_gbe_code_byte_0 = 0x02
x_gbe_code_byte_1 = 0x00
sonet_sdh_code_byte_0 = 0x00
sonet_sdh_code_byte_1 = 0x00
sonet_sdh_code_byte_2 = 0x00
sonet_sdh_code_byte_3 = 0x00
x_gfc_code_byte_0 = 0x00
x_gfc_code_byte_1 = 0x00
x_gfc_code_byte_2 = 0x00
x_gfc_code_byte_3 = 0x00
range0 = 0x03
range1 = 0xe8
fibre_type_byte_0 = 0x20
fibre_type_byte_1 = 0x00
Center Wavelength:
chan0 = 1310.00 nm

chan1 = 0.00 nm
chan2 = 0.00 nm
chan3 = 0.00 nm

basic_checksum = 0x00

Link Alarm Status Registers:
rx_alarm_control = 0x0019
tx_alarm_control = 0x0059
lasi_control = 0x0000
rx_alarm_status = 0x0018
tx_alarm_status = 0x0058
lasi_status = 0x0005

Digital Optical Monitoring:
Transceiver Temp: 34.246 C
Laser Bias Current: 4.8640 mA
Laser Output Power: 0.5059 mW, -3.0 dBm
Receive Optical Power: 0.0000 mW, -inf dBm

Quake: devid 0x0043a400
10GE PMA/PMD Registers:
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400 Speed Ability =
0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Control 2 = 0x0006 Status 2 = 0xb541 Tx
Disable = 0x0000 Rx Signal Detect = 0x0000 OUI 0 = 0x0041 OUI 1 = 0xf426

Quake (1.c001) = 0x0003

10GE PCS Registers:
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400 Speed Ability =
0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Control 2 = 0x0000 Status 2 = 0x8401 PKG ID 0
= 0x0000 PKG ID 1 = 0x0000 Base X Status = 0x0000 Base X Control = 0x0000 Base R Status 1
= 0x0004 Base R Status 2 = 0x0000 Base R jitter seed a0 = 0x0000 Base R jitter seed a1 =
0x0000 Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000 Base R jitter seed b0
= 0x0000 Base R jitter seed b1 = 0x0000 Base R jitter seed b2 = 0x0000 Base R jitter seed
b3 = 0x0000 Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
10GE XS/XS Registers:
Control = 0x2040 Status = 0x0002
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Status 2 = 0x8000 PKG ID 0 =
0x0000 PKG ID 1 = 0x0000 Lane Status = 0x1c0f Test Control = 0x0000

DTE XGXS (BCM8011):
Control = 0x0000 Status = 0x801f
Dev ID 0 = 0x0040 Dev ID 1 = 0x6092
Control 2 = 0x202f
Status 2 = 0x8b01

Speed Ability = 0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Status 2 = 0x8000 PKG ID 0 =
0x0000 PKG ID 1 = 0x0000 Lane Status = 0x1c0f Test Control = 0x0000

DTE XGXS (BCM8011):
Control = 0x0000 Status = 0x801f

```

```

Dev ID 0 = 0x0040 Dev ID 1 = 0x6092
Control 2 = 0x202f
Status 2 = 0x8b01

MAC (PLA):
Unicast MAC Address entries = 0
MAC (PLA) device is enabled
MAC (PLA) device is in promiscuous mode
MAC (PLA) device loopback is disabled

MAC (PLA) device MTU = 8226

8x10GE PLIM Registers:
local_regs_id = 0xa6602000 local_regs_inter_stat = 0x00000000 local_regs_inter_stat_alias
= 0x00000000 local_regs_inter_enbl_woset = 0x0000ff00 local_regs_inter_enbl_woclr =
0x0000ff00 local_regs_chip_reset = 0x00000000 local_regs_reset = 0xff000000
local_regs_misc_io = 0x00010000 sn_link_framed = 0x00000001 sn_link_crc_errors =
0x00000000 sn_link_force_reframe = 0x00000000 sn_link_error_reframe = 0x00000001
sn_link_force_error = 0x00000000 sn_link_error_cause = 0x00000000
sn_link_error_interrupt_mask = 0x00000003 channel0_control = 0x000000a6 channel1_control =
0x000000a6 channel2_control = 0x0000008e channel3_control = 0x0000008e channel4_control =
0x0000008e channel5_control = 0x000000a6 channel6_control = 0x000000a6 channel7_control =
0x0000008e

```

The following example shows sample output from the **show controllers TenGigE** command:

```

RP/0/RP0/CPU0:router# show controllers TenGigE 0/7/0/0
Tue Mar 22 15:32:35.491 UTC
Operational data for interface TenGigE0/7/0/0:

```

```

State:
  Administrative state: enabled
  Operational state: Up
  LED state: Green On

Phy:
  Media type: R fiber over 1310nm optics
  Optics:
    Vendor: CISCO-SUMITOMO
    Part number: SFCT-7081Z-CS2
    Serial number: AGA1447N4JE

MAC address information:
  Operational address: 0021.a03a.4744
  Burnt-in address: 0021.a03a.4744
  No unicast addresses in filter
  Operating in multicast promiscuous mode

Autonegotiation disabled.

```

```

Operational values:
  Speed: 10Gbps
  Duplex: Full Duplex
  Flowcontrol: None
  Loopback: None (or external)
  MTU: 1522
  MRU: 1522
  Inter-packet gap: standard (12)

```

The following example shows sample output from the base form of the **show controllers TenGigE** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```

RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0
Thu Oct 7 16:18:32.348 EST
Operational data for interface TenGigE0/1/0/0:

```

```

State:
  Administrative state: disabled
  Operational state: Down (Reason: Link loss or low light, no loopback)
  LED state: Yellow On

Phy:
  Media type: R fiber over 1310nm optics

```

show controllers (Ethernet)

```

Optics:
  Vendor: CISCO-SUMITOMO
  Part number: SXP3101NV-C1
  Serial number: ECL120701L2

MAC address information:
  Operational address: 0014.f294.6776
  Burnt-in address: 0014.f294.6776
  No unicast addresses in filter
  Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
  Speed: 10Gbps
  Duplex: Full Duplex
  Flowcontrol: None
  Loopback: None (or external)
  MTU: 1522
  MRU: 1522
  Inter-packet gap: standard (12)

```

The following example shows sample output from the **show controllers TenGigE** all form of the command:

```

RP/0/RP0/CPU0:router# show controllers TenGigE 0/7/0/0 all
ue Mar 22 15:32:45.685 UTC
Operational data for interface TenGigE0/7/0/0:

```

```

State:
  Administrative state: enabled
  Operational state: Up
  LED state: Green On

Phy:
  Media type: R fiber over 1310nm optics
  Optics:
    Vendor: CISCO-SUMITOMO
    Part number: SXP3101NV-C1
    Serial number: ECL120701L2

MAC address information:
  Operational address: 0021.a03a.4744
  Burnt-in address: 0021.a03a.4744
  No unicast addresses in filter
  Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
  Speed: 10Gbps
  Duplex: Full Duplex
  Flowcontrol: None
  Loopback: None (or external)
  MTU: 1522
  MRU: 1522
  Inter-packet gap: standard (12)

Statistics for interface TenGigE0/7/0/0 (cached values):

Ingress:
  Input total bytes           = 60
  Input good bytes            = 60

  Input total packets         = 1
  Input 802.1Q frames         = 0
  Input pause frames          = 0
  Input pkts 64 bytes         = 1
  Input pkts 65-127 bytes     = 0
  Input pkts 128-255 bytes    = 0
  Input pkts 256-511 bytes    = 0
  Input pkts 512-1023 bytes   = 0
  Input pkts 1024-1518 bytes  = 0
  Input pkts 1519-Max bytes   = 0

```



```

Input good pkts           = 1
Input unicast pkts        = 0
Input multicast pkts       = 0
Input broadcast pkts      = 1

Input drop overrun        = 0
Input drop abort          = 0
Input drop invalid VLAN   = 0
Input drop invalid DMAC   = 0
Input drop invalid encap  = 0
Input drop other          = 0

Input error giant         = 0
Input error runt          = 0
Input error jabbers       = 0
Input error fragments     = 0
Input error CRC           = 0
Input error collisions    = 0
Input error symbol        = 0
Input error other         = 0

Input MIB giant           = 0
Input MIB jabber          = 0
Input MIB CRC             = 0

Egress:
Output total bytes        = 0
Output good bytes         = 0

Output total packets      = 0
Output 802.1Q frames      = 0
Output pause frames       = 0
Output pkts 64 bytes      = 0
Output pkts 65-127 bytes  = 0
Output pkts 128-255 bytes = 0
Output pkts 256-511 bytes = 0
Output pkts 512-1023 bytes = 0
Output pkts 1024-1518 bytes = 0
Output pkts 1519-Max bytes = 0

Output good pkts          = 0
Output unicast pkts       = 0
Output multicast pkts     = 0
Output broadcast pkts     = 0

Output drop underrun      = 0
Output drop abort         = 0
Output drop other         = 0

Output error other        = 0

Management information for interface TenGigE0/7/0/0:

Port number: 0
Bay number: 0
Interface handle: 0x1780200

Config:
Auto-negotiation: Configuration not supported (Off)
Carrier delay (up): Not configured
Carrier delay (down): Not configured
Speed: Configuration not supported (10Gbps)
Duplex: Configuration not supported (Full Duplex)
Flow Control: Not configured (None)
IPG: Not configured (standard (12))
Loopback: Not configured (None)
MTU: Not configured
Bandwidth: Not configured
BER-SD Threshold: Configuration not supported
BER-SD Report: Configuration not supported
BER-SF Threshold: Configuration not supported
BER-SF Report: Configuration not supported
BER-SF Signal Remote Failure: Configuration not supported

```

show controllers (Ethernet)

```

Driver constraints:
  Min MTU: 64 bytes
  Max MTU: 9600 bytes
  Max speed: 10Gbps
  Interface type: TenGigE
  Management interface: No
  Promiscuous mode: Yes
  Default carrier delay up (auto-neg on): 0 ms
  Default carrier delay down (auto-neg on): 0 ms
  Default carrier delay up (auto-neg off): 0 ms
  Default carrier delay down (auto-neg off): 0 ms
  Allowed config mask: 0x27b

Cached driver state:
  MTU: 1522 bytes
  Burnt-in MAC address: 0021.a03a.4744

Operational carrier delay:
  Carrier delay (up): 0 ms
  Carrier delay (down): 0 ms

Bundle settings:
  Aggregated: No
  Bundle MTU: 1514 bytes
  Bundle MAC address: 0021.a03a.4744

Port FSM state:
  Port is enabled, link is up
Complete FSM state:
  Admin up
  Bundle admin up
  Client admin up
  Client admin tx not disabled
  Port enabled
  Port tx enabled
  Hardware link up
IDB interface state information:
  IDB bundle admin up
  IDB client admin up
  IDB client tx admin up
  IDB error disable not set

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:

0 Unicast Bundle MAC Addresses:

0 Multicast Bundle MAC Addresses:

Operational address: 0021.a03a.4744
Burnt-in address: 0021.a03a.4744

PLA 0 port 0 MAC enabled Rx MAC enabled
Administrative state: Up
Operational state: Up

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP Ethertype: 0x88e7

4 VLAN UIDB entries

```

VLAN1	VLAN2	Packet Type Flags	UIDB Result Flags
0	0	VLAN	1 VLAN
0	0	ARPA	1 ARPA
0	0	SAP	1 SAP
0	0		1 SNAP

Total Power Available on PLIM for XFP's: 35000 mW
 Power used by Inserted XFP's: 1500 mW
 Power Available: 33500 mW

Port	Power Used	State
00	1500 mW	XFP Inserted and Powered On
01	0000 mW	No XFP Inserted
02	0000 mW	No XFP Inserted
03	0000 mW	No XFP Inserted
04	0000 mW	No XFP Inserted
05	0000 mW	No XFP Inserted
06	0000 mW	No XFP Inserted
07	0000 mW	No XFP Inserted
08	0000 mW	No XFP Inserted
09	0000 mW	No XFP Inserted
10	0000 mW	No XFP Inserted
11	0000 mW	No XFP Inserted
12	0000 mW	No XFP Inserted
13	0000 mW	No XFP Inserted

802.3ae Sections
 =====

PMA/PMD

Previous Alarm Status:
 PMA/PMD NOT Locked to Local Signal
 Current Alarm Status:
 PMA/PMD Locked to Local Signal
 SR Ability
 Loopback Ability

PCS

Previous Alarm Status:
 PCS Rx Link DOWN
 PCS Rx NOT Block Locked
 PCS Rx Link Status DOWN
 PCS Error'd Block Counts: 0
 PCS BER Counts: 0
 PCS has NO Block Lock
 Current Alarm Status:
 PCS Rx Link UP
 PCS Rx Block Locked
 PCS Rx Link Status UP
 PCS Error'd Block Counts: 0
 PCS BER Counts: 0
 PCS has Block Lock

WIS: HW In LAN Mode - No Info

XFP General Info:
 =====

PHY/XFP Status: XFP is Working as expected

XFP Info:
 =====

Max Power Dissipation: 1500 mW

XFP Type: 10GBASE-LR
 Vendor Name: CISCO-SUMITOMO
 Vendor Part Number: SFCT-7081Z-CS2
 Vendor OUI: 0x00-0x17-0x6a
 Vendor Hardware Revision: 01
 Vendor Serial number: AGA1447N4JE
 Date Code (yy/mm/dd): 10/11/27
 Lot Code: 01

Cisco PID: XFP10GLR-192SR-L
 Cisco VID: V01
 Cisco PN: 10-2542-01

show controllers (Ethernet)

```

ID: XFP
Extended ID: 0x18
  TX ref clock input is not required
  CDP is supported
  Power Level 1 (1.5W max. power)
Minimum bit rate is 9900 MBits/s.
Maximum bit rate is 11100 MBits/s.

XFP Detail Info:
=====

Temp: 30.119
Tx bias: 35.178 mA
Tx power: 0.5141 mW ( -2.9 dBm)
Rx power: 0.4612 mW ( -3.4 dBm)
AUX 1: Laser Temperature: 0x40
AUX 2: +3.3V Supply Voltage: 0x7

XFP Status: enabled.
  laser is enabled
  MOD NR is ready
  is powered on
  has interrupt(s)
  has no LOS
  data is ready
  TX path is ready
  TX laser is not in fault condition
  TX path CDR is locked
  RX path is ready
  RX path CDR is locked

Alarms:
  Low RX power alarm

Warnings:
  Low TX bias warning
  Low TX power warning
  Low RX power warning

THRESHOLDS

```

		High Alarm	Low Alarm	High Warning	Low Warning
Temperature	C	78.0	0.0	73.0	5.0
Voltage	V	000.0000	000.0000	000.0000	000.0000
Bias Current	mA	090.0000	005.0000	075.0000	015.0000
Transmit power	mW	022.3870	000.7580	011.2200	001.5130
Receive power	mW	022.3870	000.1810	011.2200	000.3630

```

DTE XGXS
  Current Alarm Status:
    XGXS Lanes All Synchronized
    XGXS Lanes Aligned
PHY XGXS
  Previous Alarm Status:
    NO XGXS Local Fault
    TX Link Down
  Current Alarm Status:
    NO XGXS Local Fault
    TX Link UP

LASI 802.3ae Registers:
=====
Previous: LASI Status = 0x0001 Rx Alarm Status = 0x0004 Tx Alarm Status = 0x0020
Current: LASI Status = 0x0000 Rx Alarm Status = 0x0000 Tx Alarm Status = 0x0000

PMA/PMD 802.3ae Registers:
=====
Control = 0x2040 Status = 0x0006 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0007 Status 2 = 0xb181
Tx Disable = 0x0000 Rx Signal Detect = 0x0001
OUI 0 = 0x0000 OUI 1 = 0x0000
Current: Status = 0x0006 Status 2 = 0xb181

```

WIS 802.3ae Registers:

```

=====
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8003 Status 3 = 0x0008
Test Pattern Error Counter = 0x0000 Far End BLock Error Counter = 0x0000
J1 TX 1 = 0x0000 J1 TX 2 = 0x0000 J1 TX 3 = 0x0000 J1 TX 4 = 0x0000
J1 TX 5 = 0x0000 J1 TX 6 = 0x0000 J1 TX 7 = 0x0000 J1 TX 8 = 0x8900
J1 RX 1 = 0x0000 J1 RX 2 = 0x0000 J1 RX 3 = 0x0000 J1 RX 4 = 0x0000
J1 RX 5 = 0x0000 J1 RX 6 = 0x0000 J1 RX 7 = 0x0000 J1 RX 8 = 0x0000
Far End BIP Error 0 = 0x0000 Far End BIP Error 1 = 0x0000
Line BIP Error 0 = 0x0000 Line BIP Error 1 = 0x0000
Path BIP Error Count = 0x0000 Section BIP Error Count = 0x0000
J0 Tx 1 = 0x0000 J0 Tx 2 = 0x0000 J0 Tx 3 = 0x0000 J0 Tx 4 = 0x0000
J0 Tx 5 = 0x0000 J0 Tx 6 = 0x0000 J0 Tx 7 = 0x0000 J0 Tx 8 = 0x8900
J0 Rx 1 = 0x0000 J0 Rx 2 = 0x0000 J0 Rx 3 = 0x0000 J0 Rx 4 = 0x0000
J0 Rx 5 = 0x0000 J0 Rx 6 = 0x0000 J0 Rx 7 = 0x0000 J0 Rx 8 = 0x0000
Current: Status = 0x0082 Status 2 = 0x8003 Status 3 = 0x0008

```

PCS 802.3ae Registers:

```

=====
Control = 0x2040 Status = 0x0006 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8005
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base X Status = 0x0000 Base X Control = 0x0000
Base R Status 1 = 0x1005 Base R Status 2 = 0x8000
Base R jitter seed a0 = 0x0000 Base R jitter seed a1 = 0x0000
Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000
Base R jitter seed b0 = 0x0000 Base R jitter seed b1 = 0x0000
Base R jitter seed b2 = 0x0000 Base R jitter seed b3 = 0x0000
Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
Current: Status = 0x0006 Status 2 = 0x8005 Base R 1 = 0x1005 Base R 2 = 0x8000

```

PHY XS 802.3ae Registers:

```

=====
Control = 0x2040 Status = 0x0006
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Status 2 = 0x8000 PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Lane Status = 0x1c0f Test Control = 0x0000
Current: Status = 0x0006 Status 2 = 0x8000 Lane Status = 0x1c0f

```

XFP Register Info (MSA):

```

=====
(Reg 000 = 0x06) (Reg 001 = 0x00) (Reg 002 = 0x4e) (Reg 003 = 0x00)
(Reg 004 = 0x00) (Reg 005 = 0x00) (Reg 006 = 0x49) (Reg 007 = 0x00)
(Reg 008 = 0x05) (Reg 009 = 0x00) (Reg 010 = 0x00) (Reg 011 = 0x00)
(Reg 012 = 0x00) (Reg 013 = 0x00) (Reg 014 = 0x00) (Reg 015 = 0x00)
(Reg 016 = 0x00) (Reg 017 = 0x00) (Reg 018 = 0xaf) (Reg 019 = 0xc8)
(Reg 020 = 0x09) (Reg 021 = 0xc4) (Reg 022 = 0x92) (Reg 023 = 0x7c)
(Reg 024 = 0x1d) (Reg 025 = 0x4c) (Reg 026 = 0x57) (Reg 027 = 0x73)
(Reg 028 = 0x02) (Reg 029 = 0xf6) (Reg 030 = 0x2b) (Reg 031 = 0xd4)
(Reg 032 = 0x05) (Reg 033 = 0xe9) (Reg 034 = 0x57) (Reg 035 = 0x73)
(Reg 036 = 0x00) (Reg 037 = 0xb5) (Reg 038 = 0x2b) (Reg 039 = 0xd4)
(Reg 040 = 0x01) (Reg 041 = 0x6b) (Reg 042 = 0x5d) (Reg 043 = 0x00)
(Reg 044 = 0x00) (Reg 045 = 0x00) (Reg 046 = 0x58) (Reg 047 = 0x00)
(Reg 048 = 0x05) (Reg 049 = 0x00) (Reg 050 = 0x8d) (Reg 051 = 0xcc)
(Reg 052 = 0x74) (Reg 053 = 0x04) (Reg 054 = 0x87) (Reg 055 = 0x8c)
(Reg 056 = 0x7a) (Reg 057 = 0x44) (Reg 058 = 0x00) (Reg 059 = 0x00)
(Reg 060 = 0x00) (Reg 061 = 0x00) (Reg 062 = 0x00) (Reg 063 = 0x00)
(Reg 064 = 0x00) (Reg 065 = 0x00) (Reg 066 = 0x00) (Reg 067 = 0x00)
(Reg 068 = 0x00) (Reg 069 = 0x00) (Reg 070 = 0x00) (Reg 071 = 0x00)
(Reg 072 = 0x00) (Reg 073 = 0x00) (Reg 074 = 0x00) (Reg 075 = 0x00)
(Reg 076 = 0x00) (Reg 077 = 0x00) (Reg 078 = 0x00) (Reg 079 = 0x00)
(Reg 080 = 0x00) (Reg 081 = 0x00) (Reg 082 = 0x00) (Reg 083 = 0x00)
(Reg 084 = 0x00) (Reg 085 = 0x00) (Reg 086 = 0x00) (Reg 087 = 0x00)
(Reg 088 = 0x00) (Reg 089 = 0x00) (Reg 090 = 0x00) (Reg 091 = 0x00)
(Reg 092 = 0x00) (Reg 093 = 0x00) (Reg 094 = 0x00) (Reg 095 = 0x00)
(Reg 096 = 0x1e) (Reg 097 = 0x77) (Reg 098 = 0x00) (Reg 099 = 0x00)
(Reg 100 = 0x44) (Reg 101 = 0xb5) (Reg 102 = 0x14) (Reg 103 = 0x38)
(Reg 104 = 0x12) (Reg 105 = 0x04) (Reg 106 = 0x26) (Reg 107 = 0xda)
(Reg 108 = 0x7e) (Reg 109 = 0x32) (Reg 110 = 0x04) (Reg 111 = 0x00)

```

show controllers (Ethernet)

```

(Reg 112 = 0x00) (Reg 113 = 0x00) (Reg 114 = 0x00) (Reg 115 = 0x00)
(Reg 116 = 0x00) (Reg 117 = 0x00) (Reg 118 = 0x00) (Reg 119 = 0x00)
(Reg 120 = 0x00) (Reg 121 = 0x00) (Reg 122 = 0x00) (Reg 123 = 0x00)
(Reg 124 = 0x00) (Reg 125 = 0x00) (Reg 126 = 0x00) (Reg 127 = 0x01)

(Reg 128 = 0x06) (Reg 129 = 0x18) (Reg 130 = 0x07) (Reg 131 = 0x40)
(Reg 132 = 0x00) (Reg 133 = 0x00) (Reg 134 = 0x00) (Reg 135 = 0x40)
(Reg 136 = 0x00) (Reg 137 = 0x00) (Reg 138 = 0x00) (Reg 139 = 0xb0)
(Reg 140 = 0x63) (Reg 141 = 0x6f) (Reg 142 = 0x0a) (Reg 143 = 0x00)
(Reg 144 = 0x00) (Reg 145 = 0x00) (Reg 146 = 0x00) (Reg 147 = 0x40)
(Reg 148 = 0x43) (Reg 149 = 0x49) (Reg 150 = 0x53) (Reg 151 = 0x43)
(Reg 152 = 0x4f) (Reg 153 = 0x2d) (Reg 154 = 0x41) (Reg 155 = 0x56)
(Reg 156 = 0x41) (Reg 157 = 0x47) (Reg 158 = 0x4f) (Reg 159 = 0x20)
(Reg 160 = 0x20) (Reg 161 = 0x20) (Reg 162 = 0x20) (Reg 163 = 0x20)
(Reg 164 = 0xf9) (Reg 165 = 0x00) (Reg 166 = 0x17) (Reg 167 = 0x6a)
(Reg 168 = 0x53) (Reg 169 = 0x46) (Reg 170 = 0x43) (Reg 171 = 0x54)
(Reg 172 = 0x2d) (Reg 173 = 0x37) (Reg 174 = 0x30) (Reg 175 = 0x38)
(Reg 176 = 0x31) (Reg 177 = 0x5a) (Reg 178 = 0x2d) (Reg 179 = 0x43)
(Reg 180 = 0x53) (Reg 181 = 0x32) (Reg 182 = 0x20) (Reg 183 = 0x20)
(Reg 184 = 0x30) (Reg 185 = 0x31) (Reg 186 = 0x66) (Reg 187 = 0x58)
(Reg 188 = 0x0f) (Reg 189 = 0xa0) (Reg 190 = 0x46) (Reg 191 = 0x67)
(Reg 192 = 0x4b) (Reg 193 = 0x1e) (Reg 194 = 0x05) (Reg 195 = 0x00)
(Reg 196 = 0x41) (Reg 197 = 0x47) (Reg 198 = 0x41) (Reg 199 = 0x31)
(Reg 200 = 0x34) (Reg 201 = 0x34) (Reg 202 = 0x37) (Reg 203 = 0x4e)
(Reg 204 = 0x34) (Reg 205 = 0x4a) (Reg 206 = 0x45) (Reg 207 = 0x20)
(Reg 208 = 0x20) (Reg 209 = 0x20) (Reg 210 = 0x20) (Reg 211 = 0x20)
(Reg 212 = 0x31) (Reg 213 = 0x30) (Reg 214 = 0x31) (Reg 215 = 0x31)
(Reg 216 = 0x32) (Reg 217 = 0x37) (Reg 218 = 0x30) (Reg 219 = 0x31)
(Reg 220 = 0x08) (Reg 221 = 0x60) (Reg 222 = 0x47) (Reg 223 = 0xf4)
(Reg 224 = 0x00) (Reg 225 = 0x00) (Reg 226 = 0x06) (Reg 227 = 0xef)
(Reg 228 = 0xfa) (Reg 229 = 0xc9) (Reg 230 = 0x9a) (Reg 231 = 0x6c)
(Reg 232 = 0x5b) (Reg 233 = 0x06) (Reg 234 = 0x70) (Reg 235 = 0xc5)
(Reg 236 = 0x2d) (Reg 237 = 0xa5) (Reg 238 = 0x7f) (Reg 239 = 0xdf)
(Reg 240 = 0x9a) (Reg 241 = 0x03) (Reg 242 = 0xf6) (Reg 243 = 0x00)
(Reg 244 = 0x00) (Reg 245 = 0x00) (Reg 246 = 0x00) (Reg 247 = 0x00)
(Reg 248 = 0x00) (Reg 249 = 0x00) (Reg 250 = 0x00) (Reg 251 = 0x00)
(Reg 252 = 0xf8) (Reg 253 = 0x68) (Reg 254 = 0x92) (Reg 255 = 0xd1)

```

The following example shows sample output from the **show controllers TenGigE all** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 all
```

```
Thu Oct 7 18:23:49.231 EST
```

```
Operational data for interface TenGigE0/1/0/0:
```

```
State:
```

```
Administrative state: disabled
```

```
Operational state: Down (Reason: Link loss or low light, no loopback)
```

```
LED state: Yellow On
```

```
Phy:
```

```
Media type: R fiber over 1310nm optics
```

```
Optics:
```

```
Vendor: CISCO-SUMITOMO
```

```
Part number: SXP3101NV-C1
```

```
Serial number: ECL120701L2
```

```
MAC address information:
```

```
Operational address: 0014.f294.6776
```

```
Burnt-in address: 0014.f294.6776
```

```
No unicast addresses in filter
```

```
Operating in multicast promiscuous mode
```

```
Autonegotiation disabled.
```

```
Operational values:
```

```
Speed: 10Gbps
```

```
Duplex: Full Duplex
```

```
Flowcontrol: None
```

```
Loopback: None (or external)
```

```
MTU: 1522
```

```
MRU: 1522
```

Inter-packet gap: standard (12)

Statistics for interface TenGigE0/1/0/0 (cached values):

Ingress:

Input total bytes	= 0
Input good bytes	= 0
Input total packets	= 0
Input 802.1Q frames	= 0
Input pause frames	= 0
Input pkts 64 bytes	= 0
Input pkts 65-127 bytes	= 0
Input pkts 128-255 bytes	= 0
Input pkts 256-511 bytes	= 0
Input pkts 512-1023 bytes	= 0
Input pkts 1024-1518 bytes	= 0
Input pkts 1519-Max bytes	= 0
Input good pkts	= 0
Input unicast pkts	= 0
Input multicast pkts	= 0
Input broadcast pkts	= 0
Input drop overrun	= 0
Input drop abort	= 0
Input drop invalid VLAN	= 0
Input drop invalid DMAC	= 0
Input drop invalid encap	= 0
Input drop other	= 0
Input error giant	= 0
Input error runt	= 0
Input error jabbers	= 0
Input error fragments	= 0
Input error CRC	= 0
Input error collisions	= 0
Input error symbol	= 0
Input error other	= 0
Input MIB giant	= 0
Input MIB jabber	= 0
Input MIB CRC	= 0

Egress:

Output total bytes	= 0
Output good bytes	= 0
Output total packets	= 0
Output 802.1Q frames	= 0
Output pkts 64 bytes	= 0
Output pkts 65-127 bytes	= 0
Output pkts 128-255 bytes	= 0
Output pkts 256-511 bytes	= 0
Output pkts 512-1023 bytes	= 0
Output pkts 1024-1518 bytes	= 0
Output pkts 1519-Max bytes	= 0
Output good pkts	= 0
Output unicast pkts	= 0
Output multicast pkts	= 0
Output broadcast pkts	= 0
Output drop underrun	= 0
Output drop abort	= 0
Output drop other	= 0
Output error other	= 0

Management information for interface TenGigE0/1/0/0:

Port number: 0
Bay number: 0

show controllers (Ethernet)

```

Interface handle: 0x1180200

Config:
  Auto-negotiation: Configuration not supported (Off)
  Carrier delay (up): Not configured
  Carrier delay (down): Not configured
  Speed: Configuration not supported (10Gbps)
  Duplex: Configuration not supported (Full Duplex)
  Flow Control: Not configured (None)
  IPG: Not configured (standard (12))
  Loopback: Not configured (None)
  MTU: Not configured
  Bandwidth: Not configured --> This output field is changed
  BER-SD Threshold: Configuration not supported
  BER-SD Report: Configuration not supported
  BER-SF Threshold: Configuration not supported
  BER-SF Report: Configuration not supported
  BER-SF Signal Remote Failure: Configuration not supported

Driver constraints:
  Min MTU: 64 bytes
  Max MTU: 9600 bytes
  Max speed: 10Gbps
  Interface type: TenGigE
  Management interface: No
  Promiscuous mode: Yes
  Default carrier delay up (auto-neg on): 0 ms
  Default carrier delay down (auto-neg on): 0 ms
  Default carrier delay up (auto-neg off): 0 ms
  Default carrier delay down (auto-neg off): 0 ms
  Allowed config mask: 0x27b

Cached driver state:
  MTU: 1522 bytes
  Burnt-in MAC address: 0014.f294.6776

Operational carrier delay:
  Carrier delay (up): 0 ms
  Carrier delay (down): 0 ms

Bundle settings:
  Aggregated: No
  Bundle MTU: 1514 bytes
  Bundle MAC address: 0014.f294.6776

Port FSM state:
  Port is disabled, due to an admin down condition.
Complete FSM state:
  Admin down
  Bundle admin up
  Client admin up
  Client admin tx not disabled
  Port disabled
  Port tx disabled
  Hardware link down
IDB interface state information:
  IDB bundle admin up
  IDB client admin up
  IDB client tx admin up
  IDB error disable not set

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:

0 Unicast Bundle MAC Addresses:

0 Multicast Bundle MAC Addresses:

Operational address: 0014.f294.6776
Burnt-in address: 0014.f294.6776

```


PLA 0 port 0 MAC enabled Rx MAC disabled
 Administrative state: Forced Remote fault
 Operational state: Remote fault

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
 QinQ Ethertype: 0x88a8
 MTP Ethertype: 0x88e7

4 VLAN UIDB entries

VLAN1	VLAN2	Packet Type Flags	UIDB Result Flags
0	0	VLAN	1 VLAN
0	0	ARPA	1 ARPA
0	0	SAP	1 SAP
0	0		1 SNAP

Total Power Available on PLIM for XFP's: 35000 mW
 Power used by Inserted XFP's: 33000 mW
 Power Available: 2000 mW

Port	Power Used	State
00	2500 mW	XFP Inserted and Powered On
01	2500 mW	XFP Inserted and Powered On
02	1500 mW	XFP Inserted and Powered On
03	2500 mW	XFP Inserted and Powered On
04	2500 mW	XFP Inserted and Powered On
05	1500 mW	XFP Inserted and Powered On
06	2500 mW	XFP Inserted and Powered On
07	2500 mW	XFP Inserted and Powered On
09	2500 mW	XFP Inserted and Powered On
10	2500 mW	XFP Inserted and Powered On
11	2500 mW	XFP Inserted and Powered On
12	2500 mW	XFP Inserted and Powered On
13	2500 mW	XFP Inserted and Powered On

802.3ae Sections
 =====

PMA/PMD

Previous Alarm Status:
 PMA/PMD NOT Locked to Local Signal
 Current Alarm Status:
 PMA/PMD NOT Locked to Local Signal
 PMA/PMD Local Fault
 SR Ability
 Loopback Ability
 Rx Local Fault

PCS

Previous Alarm Status:
 PCS Rx Link DOWN
 PCS Rx NOT Block Locked
 PCS Rx Link Status DOWN
 PCS Error'd Block Counts: 0
 PCS BER Counts: 0
 PCS has NO Block Lock
 Current Alarm Status:
 PCS Rx Link DOWN
 PCS Local Fault Detected
 PCS Rx Local Fault Detected
 PCS Rx NOT Block Locked
 PCS Rx Link Status DOWN
 PCS Error'd Block Counts: 0
 PCS BER Counts: 0
 PCS has NO Block Lock

WIS: HW In LAN Mode - No Info

XFP General Info:
 =====

show controllers (Ethernet)

```

UDI Checking: Disabled
PHY/XFP Status: XFP Not UDI Compliant
  XFP is Working as expected

```

XFP Info:

```
=====
```

```
Max Power Dissipation: 2500 mW
```

```

XFP Type: 10GBASE-LR
Vendor Name: CISCO-SUMITOMO
Vendor Part Number: SXP3101NV-C1
Vendor OUI: 0x00-0x00-0x5f
Vendor Hardware Revision: C
Vendor Serial number: ECL120701L2
Date Code (yy/mm/dd): 08/02/27
Lot Code: D0

```

```

Cisco PID: XFP-10GLR-OC192SR
Cisco VID: V02
Cisco PN: 10-1989-02

```

ID: XFP

```
Extended ID: 0x58
```

```

  TX ref clock input is not required
  CDP is supported
  Power Level 2 (2.5W max. power)
  Minimum bit rate is 9900 MBits/s.
  Maximum bit rate is 10300 MBits/s.

```

XFP Detail Info:

```
=====
```

```

Temp: 32.223
Tx bias: 0.0 mA
Tx power: 0.0 mW (-40 dBm)
Rx power: 0.33 mW (-24 dBm)
AUX 1: +3.3V Supply Voltage: 0x70
AUX 2: Auxiliary monitoring not implemented: 0x0

```

XFP Status: enabled.

```

  laser is enabled
  MOD NR is not ready
  is powered off
  doesn't have interrupt(s)
  has LOS
  data is ready
  TX path is ready
  TX laser is not in fault condition
  TX path CDR is locked
  RX path is not ready
  RX path CDR is not locked

```

Alarms:

```
  Low RX power alarm
```

Warnings:

```
  Low RX power warning
```

THRESHOLDS

		High Alarm	Low Alarm	High Warning	Low Warnng
Temperature	C	80.0	-15.0	75.0	-10.0
Voltage	V	000.0000	000.0000	000.0000	000.000
Bias Current	mA	100.0000	000.0000	080.0000	000.000
Transmit power	mW	015.8480	001.2580	010.0000	001.990
Receive power	mW	022.3870	000.1810	014.1250	000.280

DTE XGXS

```

  Current Alarm Status:
    XGXS Lanes All Synchronized
    XGXS Lanes Aligned

```

PHY XGXS

```

Previous Alarm Status:
  NO XGXS Local Fault
  TX Link Down
Current Alarm Status:
  NO XGXS Local Fault
  TX Link UP

LASI 802.3ae Registers:
=====
Previous: LASI Status = 0x000d Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0020
Current: LASI Status = 0x000c Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0000

PMA/PMD 802.3ae Registers:
=====
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0007 Status 2 = 0xb581
Tx Disable = 0x0000 Rx Signal Detect = 0x0000
OUI 0 = 0x0000 OUI 1 = 0x0000
Current: Status = 0x0082 Status 2 = 0xb581

WIS 802.3ae Registers:
=====
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8003 Status 3 = 0x0048
Test Pattern Error Counter = 0x0000 Far End BLock Error Counter = 0x0000
J1 TX 1 = 0x0000 J1 TX 2 = 0x0000 J1 TX 3 = 0x0000 J1 TX 4 = 0x0000
J1 TX 5 = 0x0000 J1 TX 6 = 0x0000 J1 TX 7 = 0x0000 J1 TX 8 = 0x8900
J1 RX 1 = 0x0000 J1 RX 2 = 0x0000 J1 RX 3 = 0x0000 J1 RX 4 = 0x0000
J1 RX 5 = 0x0000 J1 RX 6 = 0x0000 J1 RX 7 = 0x0000 J1 RX 8 = 0x0000
Far End BIP Error 0 = 0x0000 Far End BIP Error 1 = 0x0000
Line BIP Error 0 = 0x0000 Line BIP Error 1 = 0x0000
Path BIP Error Count = 0x0000 Section BIP Error Count = 0x0000
J0 Tx 1 = 0x0000 J0 Tx 2 = 0x0000 J0 Tx 3 = 0x0000 J0 Tx 4 = 0x0000
J0 Tx 5 = 0x0000 J0 Tx 6 = 0x0000 J0 Tx 7 = 0x0000 J0 Tx 8 = 0x8900
J0 Rx 1 = 0x0000 J0 Rx 2 = 0x0000 J0 Rx 3 = 0x0000 J0 Rx 4 = 0x0000
J0 Rx 5 = 0x0000 J0 Rx 6 = 0x0000 J0 Rx 7 = 0x0000 J0 Rx 8 = 0x0000
Current: Status = 0x0082 Status 2 = 0x8003 Status 3 = 0x0048

PCS 802.3ae Registers:
=====
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8405
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base X Status = 0x0000 Base X Control = 0x0000
Base R Status 1 = 0x0004 Base R Status 2 = 0x0000
Base R jitter seed a0 = 0x0000 Base R jitter seed a1 = 0x0000
Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000
Base R jitter seed b0 = 0x0000 Base R jitter seed b1 = 0x0000
Base R jitter seed b2 = 0x0000 Base R jitter seed b3 = 0x0000
Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
Current: Status = 0x0082 Status 2 = 0x8405 Base R 1 = 0x0004 Base R 2 = 0x0000

PHY XS 802.3ae Registers:
=====
Control = 0x2040 Status = 0x0006
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Status 2 = 0x8000 PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Lane Status = 0x1c0f Test Control = 0x0000
Current: Status = 0x0006 Status 2 = 0x8000 Lane Status = 0x1c0f

XFP Register Info (MSA):
=====
(Reg 000 = 0x06) (Reg 001 = 0x00) (Reg 002 = 0x50) (Reg 003 = 0x00)
(Reg 004 = 0xf1) (Reg 005 = 0x00) (Reg 006 = 0x4b) (Reg 007 = 0x00)
(Reg 008 = 0xf6) (Reg 009 = 0x00) (Reg 010 = 0x00) (Reg 011 = 0x00)
(Reg 012 = 0x00) (Reg 013 = 0x00) (Reg 014 = 0x00) (Reg 015 = 0x00)
(Reg 016 = 0x00) (Reg 017 = 0x00) (Reg 018 = 0xc3) (Reg 019 = 0x50)
(Reg 020 = 0x00) (Reg 021 = 0x00) (Reg 022 = 0x9c) (Reg 023 = 0x40)
(Reg 024 = 0x00) (Reg 025 = 0x00) (Reg 026 = 0x3d) (Reg 027 = 0xe8)

```

show controllers (Ethernet)

```

(Reg 028 = 0x04) (Reg 029 = 0xea) (Reg 030 = 0x27) (Reg 031 = 0x10)
(Reg 032 = 0x07) (Reg 033 = 0xcb) (Reg 034 = 0x57) (Reg 035 = 0x73)
(Reg 036 = 0x00) (Reg 037 = 0xb5) (Reg 038 = 0x37) (Reg 039 = 0x2d)
(Reg 040 = 0x01) (Reg 041 = 0x20) (Reg 042 = 0x00) (Reg 043 = 0x00)
(Reg 044 = 0x00) (Reg 045 = 0x00) (Reg 046 = 0x00) (Reg 047 = 0x00)
(Reg 048 = 0x00) (Reg 049 = 0x00) (Reg 050 = 0x00) (Reg 051 = 0x00)
(Reg 052 = 0x00) (Reg 053 = 0x00) (Reg 054 = 0x00) (Reg 055 = 0x00)
(Reg 056 = 0x00) (Reg 057 = 0x00) (Reg 058 = 0x00) (Reg 059 = 0x00)
(Reg 060 = 0x00) (Reg 061 = 0x00) (Reg 062 = 0x00) (Reg 063 = 0x00)
(Reg 064 = 0x00) (Reg 065 = 0x00) (Reg 066 = 0x00) (Reg 067 = 0x00)
(Reg 068 = 0x00) (Reg 069 = 0x00) (Reg 070 = 0x00) (Reg 071 = 0x00)
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(Reg 092 = 0x00) (Reg 093 = 0x00) (Reg 094 = 0x00) (Reg 095 = 0x00)
(Reg 096 = 0x20) (Reg 097 = 0xdf) (Reg 098 = 0x00) (Reg 099 = 0x00)
(Reg 100 = 0x00) (Reg 101 = 0x00) (Reg 102 = 0x00) (Reg 103 = 0x00)
(Reg 104 = 0x00) (Reg 105 = 0x21) (Reg 106 = 0x7e) (Reg 107 = 0x44)
(Reg 108 = 0x00) (Reg 109 = 0x00) (Reg 110 = 0x32) (Reg 111 = 0x18)
(Reg 112 = 0x00) (Reg 113 = 0x00) (Reg 114 = 0x00) (Reg 115 = 0x00)
(Reg 116 = 0x00) (Reg 117 = 0x00) (Reg 118 = 0x00) (Reg 119 = 0x00)
(Reg 120 = 0x00) (Reg 121 = 0x00) (Reg 122 = 0x00) (Reg 123 = 0x00)
(Reg 124 = 0x00) (Reg 125 = 0x00) (Reg 126 = 0x00) (Reg 127 = 0x01)

(Reg 128 = 0x06) (Reg 129 = 0x58) (Reg 130 = 0x07) (Reg 131 = 0x40)
(Reg 132 = 0x00) (Reg 133 = 0x00) (Reg 134 = 0x00) (Reg 135 = 0x40)
(Reg 136 = 0x00) (Reg 137 = 0x00) (Reg 138 = 0x00) (Reg 139 = 0xb0)
(Reg 140 = 0x63) (Reg 141 = 0x67) (Reg 142 = 0x0a) (Reg 143 = 0x00)
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(Reg 152 = 0x4f) (Reg 153 = 0x2d) (Reg 154 = 0x53) (Reg 155 = 0x55)
(Reg 156 = 0x4d) (Reg 157 = 0x49) (Reg 158 = 0x54) (Reg 159 = 0x4f)
(Reg 160 = 0x4d) (Reg 161 = 0x4f) (Reg 162 = 0x20) (Reg 163 = 0x20)
(Reg 164 = 0xc0) (Reg 165 = 0x00) (Reg 166 = 0x00) (Reg 167 = 0x5f)
(Reg 168 = 0x53) (Reg 169 = 0x58) (Reg 170 = 0x50) (Reg 171 = 0x33)
(Reg 172 = 0x31) (Reg 173 = 0x30) (Reg 174 = 0x31) (Reg 175 = 0x4e)
(Reg 176 = 0x56) (Reg 177 = 0x2d) (Reg 178 = 0x43) (Reg 179 = 0x31)
(Reg 180 = 0x20) (Reg 181 = 0x20) (Reg 182 = 0x20) (Reg 183 = 0x20)
(Reg 184 = 0x43) (Reg 185 = 0x20) (Reg 186 = 0x66) (Reg 187 = 0x58)
(Reg 188 = 0x0f) (Reg 189 = 0xa0) (Reg 190 = 0x46) (Reg 191 = 0xbe)
(Reg 192 = 0x7d) (Reg 193 = 0x96) (Reg 194 = 0x08) (Reg 195 = 0x00)
(Reg 196 = 0x45) (Reg 197 = 0x43) (Reg 198 = 0x4c) (Reg 199 = 0x31)
(Reg 200 = 0x32) (Reg 201 = 0x30) (Reg 202 = 0x37) (Reg 203 = 0x30)
(Reg 204 = 0x31) (Reg 205 = 0x4c) (Reg 206 = 0x32) (Reg 207 = 0x20)
(Reg 208 = 0x20) (Reg 209 = 0x20) (Reg 210 = 0x20) (Reg 211 = 0x20)
(Reg 212 = 0x30) (Reg 213 = 0x38) (Reg 214 = 0x30) (Reg 215 = 0x32)
(Reg 216 = 0x32) (Reg 217 = 0x37) (Reg 218 = 0x44) (Reg 219 = 0x30)
(Reg 220 = 0x08) (Reg 221 = 0x60) (Reg 222 = 0x70) (Reg 223 = 0xb7)
(Reg 224 = 0x00) (Reg 225 = 0x00) (Reg 226 = 0x0b) (Reg 227 = 0xd0)
(Reg 228 = 0xb4) (Reg 229 = 0xd7) (Reg 230 = 0x01) (Reg 231 = 0x6d)
(Reg 232 = 0x35) (Reg 233 = 0xbd) (Reg 234 = 0x2c) (Reg 235 = 0x22)
(Reg 236 = 0xe9) (Reg 237 = 0xe2) (Reg 238 = 0x49) (Reg 239 = 0xc8)
(Reg 240 = 0xea) (Reg 241 = 0x6a) (Reg 242 = 0x2e) (Reg 243 = 0x00)
(Reg 244 = 0x00) (Reg 245 = 0x00) (Reg 246 = 0x00) (Reg 247 = 0x00)
(Reg 248 = 0x00) (Reg 249 = 0x00) (Reg 250 = 0x00) (Reg 251 = 0x00)
(Reg 252 = 0xe6) (Reg 253 = 0x39) (Reg 254 = 0x8b) (Reg 255 = 0x6e)

```

The following example shows sample output from the **show controllers TenGigE bert** command:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/6/0/2 bert
```

```
BERT status for TenGigE0/6/0/2:
```

```

BERT State           :      DISABLED
Test Pattern         :      None test pattern
Time Remaining       :      0
Time Interval        :      0

```

The following example shows sample output from the **show controllers TenGigE bert** command that is unsupported on the Cisco CRS 14-Port or Cisco CRS 20-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 bert
Thu Oct  7 18:26:01.108 EST
Command not supported on this interface
```

The following example shows sample output from the **show controllers TenGigE control** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 control
```

```
Thu Oct  7 18:26:11.815 EST
Management information for interface TenGigE0/1/0/0:
```

```
Port number: 0
Bay number: 0
Interface handle: 0x1180200
```

Config:

```
Auto-negotiation: Configuration not supported (Off)
Carrier delay (up): Not configured
Carrier delay (down): Not configured
Speed: Configuration not supported (10Gbps)
Duplex: Configuration not supported (Full Duplex)
Flow Control: Not configured (None)
IPG: Not configured (standard (12))
Loopback: Not configured (None)
MTU: Not configured
Bandwidth: Not configured
BER-SD Threshold: Configuration not supported
BER-SD Report: Configuration not supported
BER-SF Threshold: Configuration not supported
BER-SF Report: Configuration not supported
BER-SF Signal Remote Failure: Configuration not supported
```

Driver constraints:

```
Min MTU: 64 bytes
Max MTU: 9600 bytes
Max speed: 10Gbps
Interface type: TenGigE
Management interface: No
Promiscuous mode: Yes
Default carrier delay up (auto-neg on): 0 ms
Default carrier delay down (auto-neg on): 0 ms
Default carrier delay up (auto-neg off): 0 ms
Default carrier delay down (auto-neg off): 0 ms
Allowed config mask: 0x27b
```

Cached driver state:

```
MTU: 1522 bytes
Burnt-in MAC address: 0014.f294.6776
```

Operational carrier delay:

```
Carrier delay (up): 0 ms
Carrier delay (down): 0 ms
```

Bundle settings:

```
Aggregated: No
Bundle MTU: 1514 bytes
Bundle MAC address: 0014.f294.6776
```

Port FSM state:

```
Port is disabled, due to an admin down condition.
```

Complete FSM state:

```
Admin down
Bundle admin up
Client admin up
Client admin tx not disabled
Port disabled
Port tx disabled
```

show controllers (Ethernet)

```

Hardware link down
IDB interface state information:
IDB bundle admin up
IDB client admin up
IDB client tx admin up
IDB error disable not set

```

```
0 Unicast MAC Addresses:
```

```
0 Multicast MAC Addresses:
```

```
0 Unicast Bundle MAC Addresses:
```

```
0 Multicast Bundle MAC Addresses:
```

The following example shows sample output from the **show controllers TenGigE internal** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 internal
Thu Oct 7 18:27:01.022 EST
```

```

Total Power Available on PLIM for XFP's: 35000 mW
Power used by Inserted XFP's: 33000 mW
Power Available: 2000 mW

```

Port	Power Used	State
00	2500 mW	XFP Inserted and Powered On
01	2500 mW	XFP Inserted and Powered On
02	1500 mW	XFP Inserted and Powered On
03	2500 mW	XFP Inserted and Powered On
04	2500 mW	XFP Inserted and Powered On
05	1500 mW	XFP Inserted and Powered On
06	2500 mW	XFP Inserted and Powered On
07	2500 mW	XFP Inserted and Powered On
08	2500 mW	XFP Inserted and Powered On
09	2500 mW	XFP Inserted and Powered On
10	2500 mW	XFP Inserted and Powered On
11	2500 mW	XFP Inserted and Powered On
12	2500 mW	XFP Inserted and Powered On
13	2500 mW	XFP Inserted and Powered On

The following example shows sample output from the **show controllers TenGigE mac** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 mac
Thu Oct 7 18:27:34.289 EST
```

```

Operational address: 0014.f294.6776
Burnt-in address: 0014.f294.6776

```

```

PLA 0 port 0 MAC enabled Rx MAC disabled
Administrative state: Forced Remote fault
Operational state: Remote fault

```

```
0 HSRP/VRRP MAC addresses
```

```

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP Ethertype: 0x88e7

```

```
4 VLAN UIDB entries
```

VLAN1	VLAN2	Packet Type Flags	UIDB Result Flags
0	0	VLAN	1 VLAN
0	0	ARPA	1 ARPA
0	0	SAP	1 SAP
0	0		1 SNAP

The following example shows sample output from the **show controllers TenGigE phy** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 phy
Thu Oct 7 18:27:51.884 EST
```

```
802.3ae Sections
```

```
=====
PMA/PMD
  Previous Alarm Status:
    PMA/PMD NOT Locked to Local Signal
    PMA/PMD Local Fault
    SR Ability
    Loopback Ability
    Rx Local Fault
  Current Alarm Status:
    PMA/PMD NOT Locked to Local Signal
    PMA/PMD Local Fault
    SR Ability
    Loopback Ability
    Rx Local Fault

PCS
  Previous Alarm Status:
    PCS Rx Link DOWN
    PCS Local Fault Detected
    PCS Rx Local Fault Detected
    PCS Rx NOT Block Locked
    PCS Rx Link Status DOWN
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has NO Block Lock
  Current Alarm Status:
    PCS Rx Link DOWN
    PCS Local Fault Detected
    PCS Rx Local Fault Detected
    PCS Rx NOT Block Locked
    PCS Rx Link Status DOWN
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has NO Block Lock

WIS: HW In LAN Mode - No Info

XFP General Info:
=====
UDI Checking: Disabled
PHY/XFP Status: XFP Not UDI Compliant
  XFP is Working as expected

XFP Info:
=====
Max Power Dissipation: 2500 mW

XFP Type: 10GBASE-LR
Vendor Name: CISCO-SUMITOMO
Vendor Part Number: SXP3101NV-C1
Vendor OUI: 0x00-0x00-0x5f
Vendor Hardware Revision: C
Vendor Serial number: ECL120701L2
Date Code (yy/mm/dd): 08/02/27
Lot Code: D0

Cisco PID: XFP-10GLR-OC192SR
Cisco VID: V02
Cisco PN: 10-1989-02

ID: XFP
Extended ID: 0x58
  TX ref clock input is not required
  CDP is supported
  Power Level 2 (2.5W max. power)
  Minimum bit rate is 9900 Mbits/s.
  Maximum bit rate is 10300 Mbits/s.
```

show controllers (Ethernet)

```

XFP Detail Info:
=====

Temp: 32.223
Tx bias: 0.0 mA
Tx power: 0.0 mW (-40 dBm)
Rx power: 0.33 mW (-24 dBm)
AUX 1: +3.3V Supply Voltage: 0x70
AUX 2: Auxiliary monitoring not implemented: 0x0

XFP Status: enabled.
laser is enabled
MOD NR is not ready
is powered off
doesn't have interrupt(s)
has LOS
data is ready
TX path is ready
TX laser is not in fault condition
TX path CDR is locked
RX path is not ready
RX path CDR is not locked

Alarms:
  Low RX power alarm

Warnings:
  Low RX power warning

```

```

THRESHOLDS

```

		High Alarm	Low Alarm	High Warning	Low Warnng
Temperature	C	80.0	-15.0	75.0	-10.0
Voltage	V	000.0000	000.0000	000.0000	000.000
Bias Current	mA	100.0000	000.0000	080.0000	000.000
Transmit power	mW	015.8480	001.2580	010.0000	001.990
Receive power	mW	022.3870	000.1810	014.1250	000.280

The following example shows sample output from the **show controllers TenGigE regs** command:

```
RP/0/RP0/CPU0:router# show controllers GigabitEthernet 0/1/0/1 regs
```

```

MAC Registers for port: 1
GE MAC CFG      (#0954): 704c5e5a
GPCS Config    (#0147): 00000f08
GPCS Status    (#0236): 000000ca
GSERDES Status (#0237): 0007fe09

```

```
RP/0/RP0/CPU0:router# show controllers GigabitEthernet 0/4/0/0 regs
```

```

MAC Registers for port: 0
CONFIG1        (#1034): 03100a1a
CONFIG2        (#1035): 040c2398
CONTROL        (#1036): 00000000
ADDRESS_LOW    (#1037): 53ffa780
ADDRESS_HIGH   (#1038): 0000001b
MII_MGMT_CONFIG (#1039): 00000007
MII_MGMT_CMD   (#1040): 00000000
MII_MGMT_ADDRESS (#1041): 00000000
MII_MGMT_DATA  (#1042): 40000000
STAT_CONFIG    (#1043): 00000007
MASK_R         (#1044): 00000000
MASK_T         (#1045): 00000000
COMP           (#1046): 00100d24
MAC_CONFIG     (#1047): ffffffff
INTERRUPT_C    (#1048): 00000000

```

The following example shows sample output from the **show controllers TenGigE regs** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 regs
Thu Oct  7 18:28:22.640 EST
```

```

LASI 802.3ae Registers:
=====

```


Previous: LASI Status = 0x000c Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0000
 Current: LASI Status = 0x000c Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0000

PMA/PMD 802.3ae Registers:

```
=====
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0007 Status 2 = 0xb581
Tx Disable = 0x0000 Rx Signal Detect = 0x0000
OUI 0 = 0x0000 OUI 1 = 0x0000
Current: Status = 0x0082 Status 2 = 0xb581
```

WIS 802.3ae Registers:

```
=====
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8003 Status 3 = 0x0048
Test Pattern Error Counter = 0x0000 Far End BLock Error Counter = 0x0000
J1 TX 1 = 0x0000 J1 TX 2 = 0x0000 J1 TX 3 = 0x0000 J1 TX 4 = 0x0000
J1 TX 5 = 0x0000 J1 TX 6 = 0x0000 J1 TX 7 = 0x0000 J1 TX 8 = 0x8900
J1 RX 1 = 0x0000 J1 RX 2 = 0x0000 J1 RX 3 = 0x0000 J1 RX 4 = 0x0000
J1 RX 5 = 0x0000 J1 RX 6 = 0x0000 J1 RX 7 = 0x0000 J1 RX 8 = 0x0000
Far End BIP Error 0 = 0x0000 Far End BIP Error 1 = 0x0000
Line BIP Error 0 = 0x0000 Line BIP Error 1 = 0x0000
Path BIP Error Count = 0x0000 Section BIP Error Count = 0x0000
J0 Tx 1 = 0x0000 J0 Tx 2 = 0x0000 J0 Tx 3 = 0x0000 J0 Tx 4 = 0x0000
J0 Tx 5 = 0x0000 J0 Tx 6 = 0x0000 J0 Tx 7 = 0x0000 J0 Tx 8 = 0x8900
J0 Rx 1 = 0x0000 J0 Rx 2 = 0x0000 J0 Rx 3 = 0x0000 J0 Rx 4 = 0x0000
J0 Rx 5 = 0x0000 J0 Rx 6 = 0x0000 J0 Rx 7 = 0x0000 J0 Rx 8 = 0x0000
Current: Status = 0x0082 Status 2 = 0x8003 Status 3 = 0x0048
```

PCS 802.3ae Registers:

```
=====
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8405
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base X Status = 0x0000 Base X Control = 0x0000
Base R Status 1 = 0x0004 Base R Status 2 = 0x0000
Base R jitter seed a0 = 0x0000 Base R jitter seed a1 = 0x0000
Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000
Base R jitter seed b0 = 0x0000 Base R jitter seed b1 = 0x0000
Base R jitter seed b2 = 0x0000 Base R jitter seed b3 = 0x0000
Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
Current: Status = 0x0082 Status 2 = 0x8405 Base R 1 = 0x0004 Base R 2 = 0x0000
```

PHY XS 802.3ae Registers:

```
=====
Control = 0x2040 Status = 0x0006
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Status 2 = 0x8000 PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Lane Status = 0x1c0f Test Control = 0x0000
Current: Status = 0x0006 Status 2 = 0x8000 Lane Status = 0x1c0f
```

XFP Register Info (MSA):

```
=====
(Reg 000 = 0x06) (Reg 001 = 0x00) (Reg 002 = 0x50) (Reg 003 = 0x00)
(Reg 004 = 0xf1) (Reg 005 = 0x00) (Reg 006 = 0x4b) (Reg 007 = 0x00)
(Reg 008 = 0xf6) (Reg 009 = 0x00) (Reg 010 = 0x00) (Reg 011 = 0x00)
(Reg 012 = 0x00) (Reg 013 = 0x00) (Reg 014 = 0x00) (Reg 015 = 0x00)
(Reg 016 = 0x00) (Reg 017 = 0x00) (Reg 018 = 0xc3) (Reg 019 = 0x50)
(Reg 020 = 0x00) (Reg 021 = 0x00) (Reg 022 = 0x9c) (Reg 023 = 0x40)
(Reg 024 = 0x00) (Reg 025 = 0x00) (Reg 026 = 0x3d) (Reg 027 = 0xe8)
(Reg 028 = 0x04) (Reg 029 = 0xea) (Reg 030 = 0x27) (Reg 031 = 0x10)
(Reg 032 = 0x07) (Reg 033 = 0xcb) (Reg 034 = 0x57) (Reg 035 = 0x73)
(Reg 036 = 0x00) (Reg 037 = 0xb5) (Reg 038 = 0x37) (Reg 039 = 0x2d)
(Reg 040 = 0x01) (Reg 041 = 0x20) (Reg 042 = 0x00) (Reg 043 = 0x00)
(Reg 044 = 0x00) (Reg 045 = 0x00) (Reg 046 = 0x00) (Reg 047 = 0x00)
(Reg 048 = 0x00) (Reg 049 = 0x00) (Reg 050 = 0x00) (Reg 051 = 0x00)
(Reg 052 = 0x00) (Reg 053 = 0x00) (Reg 054 = 0x00) (Reg 055 = 0x00)
(Reg 056 = 0x00) (Reg 057 = 0x00) (Reg 058 = 0x00) (Reg 059 = 0x00)
(Reg 060 = 0x00) (Reg 061 = 0x00) (Reg 062 = 0x00) (Reg 063 = 0x00)
```

show controllers (Ethernet)

```

(Reg 064 = 0x00) (Reg 065 = 0x00) (Reg 066 = 0x00) (Reg 067 = 0x00)
(Reg 068 = 0x00) (Reg 069 = 0x00) (Reg 070 = 0x00) (Reg 071 = 0x00)
(Reg 072 = 0x00) (Reg 073 = 0x00) (Reg 074 = 0x00) (Reg 075 = 0x00)
(Reg 076 = 0x00) (Reg 077 = 0x00) (Reg 078 = 0x00) (Reg 079 = 0x00)
(Reg 080 = 0x00) (Reg 081 = 0x40) (Reg 082 = 0x00) (Reg 083 = 0x40)
(Reg 084 = 0x1e) (Reg 085 = 0x00) (Reg 086 = 0x00) (Reg 087 = 0x00)
(Reg 088 = 0x00) (Reg 089 = 0x00) (Reg 090 = 0x00) (Reg 091 = 0x00)
(Reg 092 = 0x00) (Reg 093 = 0x00) (Reg 094 = 0x00) (Reg 095 = 0x00)
(Reg 096 = 0x20) (Reg 097 = 0xdf) (Reg 098 = 0x00) (Reg 099 = 0x00)
(Reg 100 = 0x00) (Reg 101 = 0x00) (Reg 102 = 0x00) (Reg 103 = 0x00)
(Reg 104 = 0x00) (Reg 105 = 0x21) (Reg 106 = 0x7e) (Reg 107 = 0x44)
(Reg 108 = 0x00) (Reg 109 = 0x00) (Reg 110 = 0x32) (Reg 111 = 0x18)
(Reg 112 = 0x00) (Reg 113 = 0x00) (Reg 114 = 0x00) (Reg 115 = 0x00)
(Reg 116 = 0x00) (Reg 117 = 0x00) (Reg 118 = 0x00) (Reg 119 = 0x00)
(Reg 120 = 0x00) (Reg 121 = 0x00) (Reg 122 = 0x00) (Reg 123 = 0x00)
(Reg 124 = 0x00) (Reg 125 = 0x00) (Reg 126 = 0x00) (Reg 127 = 0x01)

(Reg 128 = 0x06) (Reg 129 = 0x58) (Reg 130 = 0x07) (Reg 131 = 0x40)
(Reg 132 = 0x00) (Reg 133 = 0x00) (Reg 134 = 0x00) (Reg 135 = 0x40)
(Reg 136 = 0x00) (Reg 137 = 0x00) (Reg 138 = 0x00) (Reg 139 = 0xb0)
(Reg 140 = 0x63) (Reg 141 = 0x67) (Reg 142 = 0x0a) (Reg 143 = 0x00)
(Reg 144 = 0x00) (Reg 145 = 0x00) (Reg 146 = 0x00) (Reg 147 = 0x40)
(Reg 148 = 0x43) (Reg 149 = 0x49) (Reg 150 = 0x53) (Reg 151 = 0x43)
(Reg 152 = 0x4f) (Reg 153 = 0x2d) (Reg 154 = 0x53) (Reg 155 = 0x55)
(Reg 156 = 0x4d) (Reg 157 = 0x49) (Reg 158 = 0x54) (Reg 159 = 0x4f)
(Reg 160 = 0x4d) (Reg 161 = 0x4f) (Reg 162 = 0x20) (Reg 163 = 0x20)
(Reg 164 = 0xc0) (Reg 165 = 0x00) (Reg 166 = 0x00) (Reg 167 = 0x5f)
(Reg 168 = 0x53) (Reg 169 = 0x58) (Reg 170 = 0x50) (Reg 171 = 0x33)
(Reg 172 = 0x31) (Reg 173 = 0x30) (Reg 174 = 0x31) (Reg 175 = 0x4e)
(Reg 176 = 0x56) (Reg 177 = 0x2d) (Reg 178 = 0x43) (Reg 179 = 0x31)
(Reg 180 = 0x20) (Reg 181 = 0x20) (Reg 182 = 0x20) (Reg 183 = 0x20)
(Reg 184 = 0x43) (Reg 185 = 0x20) (Reg 186 = 0x66) (Reg 187 = 0x58)
(Reg 188 = 0x0f) (Reg 189 = 0xa0) (Reg 190 = 0x46) (Reg 191 = 0xbe)
(Reg 192 = 0x7d) (Reg 193 = 0x96) (Reg 194 = 0x08) (Reg 195 = 0x00)
(Reg 196 = 0x45) (Reg 197 = 0x43) (Reg 198 = 0x4c) (Reg 199 = 0x31)
(Reg 200 = 0x32) (Reg 201 = 0x30) (Reg 202 = 0x37) (Reg 203 = 0x30)
(Reg 204 = 0x31) (Reg 205 = 0x4c) (Reg 206 = 0x32) (Reg 207 = 0x20)
(Reg 208 = 0x20) (Reg 209 = 0x20) (Reg 210 = 0x20) (Reg 211 = 0x20)
(Reg 212 = 0x30) (Reg 213 = 0x38) (Reg 214 = 0x30) (Reg 215 = 0x32)
(Reg 216 = 0x32) (Reg 217 = 0x37) (Reg 218 = 0x44) (Reg 219 = 0x30)
(Reg 220 = 0x08) (Reg 221 = 0x60) (Reg 222 = 0x70) (Reg 223 = 0xb7)
(Reg 224 = 0x00) (Reg 225 = 0x00) (Reg 226 = 0x0b) (Reg 227 = 0xd0)
(Reg 228 = 0xb4) (Reg 229 = 0xd7) (Reg 230 = 0x01) (Reg 231 = 0x6d)
(Reg 232 = 0x35) (Reg 233 = 0xbd) (Reg 234 = 0x2c) (Reg 235 = 0x22)
(Reg 236 = 0xe9) (Reg 237 = 0xe2) (Reg 238 = 0x49) (Reg 239 = 0xc8)
(Reg 240 = 0xea) (Reg 241 = 0x6a) (Reg 242 = 0x2e) (Reg 243 = 0x00)
(Reg 244 = 0x00) (Reg 245 = 0x00) (Reg 246 = 0x00) (Reg 247 = 0x00)
(Reg 248 = 0x00) (Reg 249 = 0x00) (Reg 250 = 0x00) (Reg 251 = 0x00)
(Reg 252 = 0xe6) (Reg 253 = 0x39) (Reg 254 = 0x8b) (Reg 255 = 0x6e)

```

The following example shows sample output from the **show controllers TenGigE stats** command:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/4/0/0 stats
```

Statistics for interface TenGigE0/4/0/0 (cached values):

```

Ingress:
  Input total bytes          = 9614339316
  Input good bytes          = 9614339316

  Input total packets       = 106713557
  Input 802.1Q frames       = 0
  Input pause frames       = 0
  Input pkts 64 bytes      = 103907216
  Input pkts 65-127 bytes  = 2494185
  Input pkts 128-255 bytes = 3410
  Input pkts 256-511 bytes = 3406
  Input pkts 512-1023 bytes = 2
  Input pkts 1024-1518 bytes = 0
  Input pkts 1519-Max bytes = 305338

  Input good pkts          = 106713557
  Input unicast pkts       = 105627141
  Input multicast pkts     = 1086414

```

```

Input broadcast pkts      = 2

Input drop overrun        = 0
Input drop abort          = 0
Input drop unknown 802.1Q = 0
Input drop other          = 0

Input error giant         = 0
Input error runt          = 0
Input error jabbers       = 0
Input error fragments     = 0
Input error CRC           = 0
Input error collisions    = 0
Input error symbol        = 0
Input error other         = 0

Input MIB giant           = 305338
Input MIB jabber          = 0
Input MIB CRC             = 0

Egress:
Output total bytes        = 15202682421
Output good bytes         = 15202682421

Output total packets      = 107534855
Output 802.1Q frames     = 0
Output pause frames      = 0
Output pkts 64 bytes     = 103862713
Output pkts 65-127 bytes = 2448054
Output pkts 128-255 bytes = 308716
Output pkts 256-511 bytes = 6
Output pkts 512-1023 bytes = 13
Output pkts 1024-1518 bytes = 0
Output pkts 1519-Max bytes = 915353

Output good pkts          = 107534855
Output unicast pkts       = 105321133
Output multicast pkts     = 1298368
Output broadcast pkts     = 1

Output drop underrun      = 0
Output drop abort         = 0
Output drop other         = 0

Output error other        = 0

```

The following example shows sample output from the **show controllers TenGigE stats** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 stats
```

```
Thu Oct  7 18:29:16.631 EST
Statistics for interface TenGigE0/1/0/0 (cached values):
```

```

Ingress:
Input total bytes        = 0
Input good bytes         = 0

Input total packets      = 0
Input 802.1Q frames     = 0
Input pause frames      = 0
Input pkts 64 bytes     = 0
Input pkts 65-127 bytes = 0
Input pkts 128-255 bytes = 0
Input pkts 256-511 bytes = 0
Input pkts 512-1023 bytes = 0
Input pkts 1024-1518 bytes = 0
Input pkts 1519-Max bytes = 0

Input good pkts          = 0
Input unicast pkts       = 0
Input multicast pkts     = 0
Input broadcast pkts     = 0

```

show controllers (Ethernet)

```

Input drop overrun          = 0
Input drop abort            = 0
Input drop invalid VLAN     = 0
Input drop invalid DMAC     = 0
Input drop invalid encap    = 0
Input drop other            = 0

Input error giant           = 0
Input error runt            = 0
Input error jabbers         = 0
Input error fragments       = 0
Input error CRC             = 0
Input error collisions      = 0
Input error symbol          = 0
Input error other           = 0

Input MIB giant             = 0
Input MIB jabber            = 0
Input MIB CRC               = 0

Egress:
Output total bytes          = 0
Output good bytes           = 0

Output total packets        = 0
Output 802.1Q frames        = 0
Output pause frames         = 0
Output pkts 64 bytes        = 0
Output pkts 65-127 bytes    = 0
Output pkts 128-255 bytes   = 0
Output pkts 256-511 bytes   = 0
Output pkts 512-1023 bytes  = 0
Output pkts 1024-1518 bytes = 0
Output pkts 1519-Max bytes  = 0

Output good pkts            = 0
Output unicast pkts         = 0
Output multicast pkts       = 0
Output broadcast pkts       = 0

Output drop underrun        = 0
Output drop abort           = 0
Output drop other           = 0

Output error other          = 0

```

The following example shows sample output from the **show controllers TenGigE xgxs** command:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/4/0/0 xgxs
```

```

Serdes Registers and info port: 0
  EDC Status      : 000000070 - EDC tracking
  Rx detected     : Yes
  Block lock      : Yes
  Tx aligned      : Yes

```

The following example shows sample output from the **show controllers TenGigE stats** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0/CPU0:router# show controllers TenGigE 0/1/0/0 xgxs
```

```

Thu Oct  7 18:30:03.732 EST
DTE XGXS
  Current Alarm Status:
    XGXS Lanes All Synchronized
    XGXS Lanes Aligned
PHY XGXS
  Previous Alarm Status:
    NO XGXS Local Fault
    TX Link UP
  Current Alarm Status:
    NO XGXS Local Fault
    TX Link UP

```

The following example shows sample output from the **show controllers HundredGigE** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0
Tue Mar 22 06:00:35.411 UTC
Operational data for interface HundredGigE0/3/0/0:
```

```
State:
  Administrative state: enabled
  Operational state: Up
  LED state: Green On

Phy:
  Media type: fiber over 4 Lane optics
  Optics:
    Vendor: CISCO-SUMITOMO
    Part number: SXP3101NV-C1
    Serial number: ECL120701L2

MAC address information:
  Operational address: 001d.70b6.6810
  Burnt-in address: 001d.70b6.6810
  No unicast addresses in filter
  Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
  Speed: 100Gbps
  Duplex: Full Duplex
  Flowcontrol: None
  Loopback: None (or external)
  MTU: 9196
  MRU: 9196
  Inter-packet gap: standard (12)
```

The following example shows sample output from the **show controllers HundredGigE all** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 all
Tue Mar 22 06:00:57.557 UTC
Operational data for interface HundredGigE0/3/0/0:
```

```
State:
  Administrative state: enabled
  Operational state: Up
  LED state: Green On

Phy:
  Media type: fiber over 4 Lane optics
  Optics:
    Vendor: CISCO-SUMITOMO
    Part number: FTLC1181RDNS-C1
    Serial number: C22CSLA

MAC address information:
  Operational address: 001d.70b6.6810
  Burnt-in address: 001d.70b6.6810
  No unicast addresses in filter
  Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
  Speed: 100Gbps
  Duplex: Full Duplex
  Flowcontrol: None
  Loopback: None (or external)
  MTU: 9196
  MRU: 9196
  Inter-packet gap: standard (12)
```

show controllers (Ethernet)

Statistics for interface HundredGigE0/3/0/0 (cached values):

```
Ingress:
  Input total bytes           = 71105513310820
  Input good bytes           = 71074510205068

  Input total packets        = 7750770507
  Input 802.1Q frames        = 0
  Input pause frames        = 0
  Input pkts 64 bytes        = 895
  Input pkts 65-127 bytes    = 5118
  Input pkts 128-255 bytes   = 57
  Input pkts 256-511 bytes   = 2
  Input pkts 512-1023 bytes  = 1
  Input pkts 1024-1518 bytes = 4
  Input pkts 1519-Max bytes  = 7750764430

  Input good pkts            = 7750770506
  Input unicast pkts         = 7750765816
  Input multicast pkts       = 4689
  Input broadcast pkts       = 1

  Input drop overrun         = 0
  Input drop abort           = 0
  Input drop invalid VLAN    = 0
  Input drop invalid DMAC    = 0
  Input drop invalid encap   = 0
  Input drop other           = 6947

  Input error giant          = 0
  Input error runt           = 0
  Input error jabbers        = 0
  Input error fragments      = 0
  Input error CRC            = 1
  Input error collisions     = 0
  Input error symbol         = 3
  Input error other          = 0

  Input MIB giant            = 0
  Input MIB jabber           = 0
  Input MIB CRC              = 0
```

```
Egress:
  Output total bytes         = 67727813126508
  Output good bytes          = 67698282738660

  Output total packets       = 7382593804
  Output 802.1Q frames       = 0
  Output pause frames        = 0
  Output pkts 64 bytes        = 702
  Output pkts 65-127 bytes    = 10272
  Output pkts 128-255 bytes   = 267
  Output pkts 256-511 bytes   = 5
  Output pkts 512-1023 bytes  = 0
  Output pkts 1024-1518 bytes = 6
  Output pkts 1519-Max bytes  = 7382582552

  Output good pkts           = 7382593804
  Output unicast pkts        = 7382590409
  Output multicast pkts      = 3391
  Output broadcast pkts      = 6

  Output drop underrun       = 0
  Output drop abort          = 2
  Output drop other          = 2373

  Output error other         = 0
```

Management information for interface HundredGigE0/3/0/0:

```
Port number: 0
Bay number: 0
Interface handle: 0x1380040
```

```
Config:
  Auto-negotiation: Configuration not supported (Off)
  Carrier delay (up): Not configured
  Carrier delay (down): Not configured
  Speed: Configuration not supported (100Gbps)
  Duplex: Configuration not supported (Full Duplex)
  Flow Control: Not configured (None)
  IPG: Configuration not supported (standard (12))
  Loopback: Not configured (None)
  MTU: 9188 bytes
  Bandwidth: Not configured
  BER-SD Threshold: Configuration not supported
  BER-SD Report: Configuration not supported
  BER-SF Threshold: Configuration not supported
  BER-SF Report: Configuration not supported
  BER-SF Signal Remote Failure: Configuration not supported

Driver constraints:
  Min MTU: 64 bytes
  Max MTU: 9600 bytes
  Max speed: 100Gbps
  Interface type: HundredGigE
  Management interface: No
  Promiscuous mode: Yes
  Default carrier delay up (auto-neg on): 0 ms
  Default carrier delay down (auto-neg on): 0 ms
  Default carrier delay up (auto-neg off): 0 ms
  Default carrier delay down (auto-neg off): 0 ms
  Allowed config mask: 0x26b

Cached driver state:
  MTU: 9196 bytes
  Burnt-in MAC address: 001d.70b6.6810

Operational carrier delay:
  Carrier delay (up): 0 ms
  Carrier delay (down): 0 ms

Bundle settings:
  Aggregated: No
  Bundle MTU: 1514 bytes
  Bundle MAC address: 001d.70b6.6810

Port FSM state:
  Port is enabled, link is up
Complete FSM state:
  Admin up
  Bundle admin up
  Client admin up
  Client admin tx not disabled
  Port enabled
  Port tx enabled
  Hardware link up
IDB interface state information:
  IDB bundle admin up
  IDB client admin up
  IDB client tx admin up
  IDB error disable not set

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:

0 Unicast Bundle MAC Addresses:

0 Multicast Bundle MAC Addresses:

Operational address: 001d.70b6.6810
Burnt-in address: 001d.70b6.6810
MAC state for beluga 0 port 0
```

show controllers (Ethernet)

```

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP Ethertype: 0x88e7

4 VLAN UIDB entries
VLAN1  VLAN2      Packet Type Flags      UIDB Result Flags
  0       0          VLAN                      1 VLAN
  0       0          ARPA                      1 ARPA
  0       0          SAP                        1 SAP
  0       0                      1 SNAP

PLIM 1 Port HundredGigE Internal Information:
shmwin pointer: 0x581d4264
shmwin id      : 0x3c
shmwin initlization: complete
shmwin mac stats pointer: 0x603d3020
shmwin mac stats version: 0x1
shmwin ctx pointer: 0x603db07c
shmwin ctx version: 0x1
HW initlization: completed
Maximum CFP power class supported: 4
Maximum CFP power consumption supported: 30000 mW

802.3ba PCS
  Previous PCS Alarms:
    PCS Link had fault

  Current PCS Status:
    PCS is able to support 100GBASE-R
    PCS is Block Locked
    PCS Rx Link Status is UP
    PCS Errored Block Counts: 0
    PCS BER (Sync Header Error) Counts: 0

PCS detailed information:

  RX Service Interface Lane Sync Header Lock Status:

    Lane-0 : Locked      Lane-10 : Locked
    Lane-1 : Locked      Lane-11 : Locked
    Lane-2 : Locked      Lane-12 : Locked
    Lane-3 : Locked      Lane-13 : Locked
    Lane-4 : Locked      Lane-14 : Locked
    Lane-5 : Locked      Lane-15 : Locked
    Lane-6 : Locked      Lane-16 : Locked
    Lane-7 : Locked      Lane-17 : Locked
    Lane-8 : Locked      Lane-18 : Locked
    Lane-9 : Locked      Lane-19 : Locked

  RX Service Interface Lane Marker Lock Status:

    Lane-0 : Locked      Lane-10 : Locked
    Lane-1 : Locked      Lane-11 : Locked
    Lane-2 : Locked      Lane-12 : Locked
    Lane-3 : Locked      Lane-13 : Locked
    Lane-4 : Locked      Lane-14 : Locked
    Lane-5 : Locked      Lane-15 : Locked
    Lane-6 : Locked      Lane-16 : Locked
    Lane-7 : Locked      Lane-17 : Locked
    Lane-8 : Locked      Lane-18 : Locked
    Lane-9 : Locked      Lane-19 : Locked

Mapping of Service Interface Lane and RX PCS Lane:

Rx Service Interface Lane 0 = PCS Lane 11
Rx Service Interface Lane 1 = PCS Lane 1
Rx Service Interface Lane 2 = PCS Lane 0
Rx Service Interface Lane 3 = PCS Lane 12
Rx Service Interface Lane 4 = PCS Lane 10
Rx Service Interface Lane 5 = PCS Lane 3
Rx Service Interface Lane 6 = PCS Lane 4

```



```

Rx Service Interface Lane 7 = PCS Lane 14
Rx Service Interface Lane 8 = PCS Lane 2
Rx Service Interface Lane 9 = PCS Lane 13
Rx Service Interface Lane 10 = PCS Lane 15
Rx Service Interface Lane 11 = PCS Lane 7
Rx Service Interface Lane 12 = PCS Lane 5
Rx Service Interface Lane 13 = PCS Lane 16
Rx Service Interface Lane 14 = PCS Lane 9
Rx Service Interface Lane 15 = PCS Lane 6
Rx Service Interface Lane 16 = PCS Lane 8
Rx Service Interface Lane 17 = PCS Lane 17
Rx Service Interface Lane 18 = PCS Lane 18
Rx Service Interface Lane 19 = PCS Lane 19

```

PCS Lane BIP Error Counters:

```

Lane-0 : 0           Lane-10 : 0
Lane-1 : 0           Lane-11 : 0
Lane-2 : 0           Lane-12 : 0
Lane-3 : 0           Lane-13 : 0
Lane-4 : 0           Lane-14 : 0
Lane-5 : 0           Lane-15 : 0
Lane-6 : 0           Lane-16 : 0
Lane-7 : 0           Lane-17 : 0
Lane-8 : 0           Lane-18 : 0
Lane-9 : 0           Lane-19 : 0

```

```

Total PCS Lane BIP Error Count : 0
Total PCS Lane Sync Header Error Count : 0
Total PCS Lane Bad 64/66 Code Count : 3

```

Serdes section:
=====

```

None of 10 RX serial inputs detects loss of signal.
All of 10 Tx clock multiplication units are locked.
All of 10 Rx clock/data recovery units are locked.
None of 10 TX FIFO has underflow/overflow condition.
None of 10 RX FIFO has underflow/overflow condition.

```

CFP section:
=====

CFP General Information:

```

Module Identifier:      CFP
Ethernet Application Code: 100GBASE-LR4
Module State:          Ready
Power Class:           3
Maximum Power Consumption: 23000 mW

```

CFP Vendor Information:

```

Vendor Name:           CISCO-SUMITOMO CORP.
Vendor PN:             FTLC1181RDNS-C1
Vendor SN:             C22CSLA
Vendor OUI:            0x0-0x90-0x65
Lot Code:              00
DATE CODE(YYYY/MM/DD): 2010/06/02
CFP MSA Hardware Version: 1.0
CFP MSA MDIO Version:  1.2
Vendor Hardware Version: 1.2
Vendor Firmware Version: 1.4

```

CFP UDI Information:

```

UDI Compliant: Yes
Cisco PID: CFP-100G-LR4
Cisco VID: VES1

```

CFP Cisco Information:

show controllers (Ethernet)

```

Vendor Name: CISCO
Cisco PN   : 10-2549-01   Rev 01
Cisco SN   : FNS14221PDX

```

CFP Detail Information:

Number of lanes supported:

```

Number of network lanes: 4
Number of host lanes   : 10

```

Time required by module:

```

Maximum high-power-up time   : 15 s
Maximum high-power-down time : 0 s
Maximum tx-turn-on time     : 1 s
Maximum tx-turn-off time    : 0 ms

```

Module general control:

```

Soft reset asserted      : No
Soft low power asserted  : No
Soft tx disable asserted : No
Soft program control 3 asserted: No
Soft program control 2 asserted: No
Soft program control 1 asserted: No
Soft global alarm test asserted: No

```

```

Tx disable pin asserted: No
Low power pin asserted : No
Program control 3 pin asserted: Yes
Program control 2 pin asserted: Yes
Program control 1 pin asserted: Yes

```

Module Analog A/D value:

```

Power supply voltage : 3.1939 V
Temperature          : 38.5889 degC

```

Network lane A/D value:

```

Lane 0 Tx power: 1.2829 mW ( 1.1 dBm)
Lane 1 Tx power: 1.3931 mW ( 1.4 dBm)
Lane 2 Tx power: 1.4443 mW ( 1.6 dBm)
Lane 3 Tx power: 1.4791 mW ( 1.7 dBm)

Lane 0 Rx power: 1.1029 mW ( 0.4 dBm)
Lane 1 Rx power: 1.3673 mW ( 1.4 dBm)
Lane 2 Rx power: 1.3457 mW ( 1.3 dBm)
Lane 3 Rx power: 1.4423 mW ( 1.6 dBm)

Total Tx power : 5.5994 mW ( 7.5 dBm)
Total Rx power : 5.2582 mW ( 7.2 dBm)

```

No XGXS present

PCS 802.3ba Registers:

```

=====
Control 1 = 0x0010
Status 1 = 0x0004
Dev ID 0 = 0x0000 Dev ID 1 = 0x0000
Speed Ability = 0x0008
Devices 1 = 0x0004 Devices 2 = 0x0000
Control 2 = 0x0005
Status 2 = 0x0020
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base R Status 1 = 0x1001
Base R Status 2 = 0x8000
BER high order counter = 0x0000
Errored blocks high order counter = 0x8000
Base R test pattern control = 0x0080
Base R test pattern error counter = 0x0000
Multi-lane BASE-R alignment status 1 = 0x10ff

```

```

Multi-lane BASE-R alignment status 2 = 0x0fff
Multi-lane BASE-R alignment status 3 = 0x00ff
Multi-lane BASE-R alignment status 4 = 0x0fff
BIP error counter lane 0 = 0x0000
BIP error counter lane 1 = 0x0000
BIP error counter lane 2 = 0x0000
BIP error counter lane 3 = 0x0000
BIP error counter lane 4 = 0x0000
BIP error counter lane 5 = 0x0000
BIP error counter lane 6 = 0x0000
BIP error counter lane 7 = 0x0000
BIP error counter lane 8 = 0x0000
BIP error counter lane 9 = 0x0000
BIP error counter lane 10 = 0x0000
BIP error counter lane 11 = 0x0000
BIP error counter lane 12 = 0x0000
BIP error counter lane 13 = 0x0000
BIP error counter lane 14 = 0x0000
BIP error counter lane 15 = 0x0000
BIP error counter lane 16 = 0x0000
BIP error counter lane 17 = 0x0000
BIP error counter lane 18 = 0x0000
BIP error counter lane 19 = 0x0000
Lane mapping register 0 = 0x000b
Lane mapping register 1 = 0x0001
Lane mapping register 2 = 0x0000
Lane mapping register 3 = 0x000c
Lane mapping register 4 = 0x000a
Lane mapping register 5 = 0x0003
Lane mapping register 6 = 0x0004
Lane mapping register 7 = 0x000e
Lane mapping register 8 = 0x0002
Lane mapping register 9 = 0x000d
Lane mapping register 10 = 0x000f
Lane mapping register 11 = 0x0007
Lane mapping register 12 = 0x0005
Lane mapping register 13 = 0x0010
Lane mapping register 14 = 0x0009
Lane mapping register 15 = 0x0006
Lane mapping register 16 = 0x0008
Lane mapping register 17 = 0x0011
Lane mapping register 18 = 0x0012
Lane mapping register 19 = 0x0013

Serdes registers:
=====

Chip id register: 0x8154
Chip revision id register: 0x1
Digital control 1 register register:
  serdes0:0x017a, serdes1:0x017a, serdes2:0x017a, serdes3:0x017a, serdes4:0x017a
  serdes5:0x017a, serdes6:0x017a, serdes7:0x017a, serdes8:0x017a, serdes9:0x017a
Digital control 2 register register:
  serdes0:0x0305, serdes1:0x0305, serdes2:0x0305, serdes3:0x0305, serdes4:0x0305
  serdes5:0x0305, serdes6:0x0305, serdes7:0x0305, serdes8:0x0305, serdes9:0x0305
Digital control 3 register register:
  serdes0:0x0d0f, serdes1:0x0d0f, serdes2:0x0d0f, serdes3:0x0d0f, serdes4:0x0d0f
  serdes5:0x0d0f, serdes6:0x0d0f, serdes7:0x0d0f, serdes8:0x0d0f, serdes9:0x0d0f
Digital control 5 register register:
  serdes0:0x6de0, serdes1:0x6de0, serdes2:0x6de0, serdes3:0x6de0, serdes4:0x6de0
  serdes5:0x6de0, serdes6:0x6de0, serdes7:0x6de0, serdes8:0x6de0, serdes9:0x6de0
Digital status 0 register register:
  serdes0:0x303b, serdes1:0x303b, serdes2:0x303b, serdes3:0x303b, serdes4:0x303b
  serdes5:0x303b, serdes6:0x303b, serdes7:0x303b, serdes8:0x303b, serdes9:0x303b
Line PRBS control register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
Line PRBS status register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
System PRBS control register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000

```

show controllers (Ethernet)

```

System PRBS status register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
PRBS status 2 register register:
  serdes0:0x8008, serdes1:0x8008, serdes2:0x8008, serdes3:0x8008, serdes4:0x8008
  serdes5:0x8008, serdes6:0x8008, serdes7:0x8008, serdes8:0x8008, serdes9:0x8008
TX control 1 register register:
  serdes0:0x1884, serdes1:0x1884, serdes2:0x1884, serdes3:0x1884, serdes4:0x1884
  serdes5:0x1884, serdes6:0x1884, serdes7:0x1884, serdes8:0x1884, serdes9:0x1884
TX control 2 register register:
  serdes0:0x00a0, serdes1:0x00a0, serdes2:0x00a0, serdes3:0x00a0, serdes4:0x00a0
  serdes5:0x00a0, serdes6:0x00a0, serdes7:0x00a0, serdes8:0x00a0, serdes9:0x00a0
TX control 4 register register:
  serdes0:0x2412, serdes1:0x2412, serdes2:0x2412, serdes3:0x2412, serdes4:0x2412
  serdes5:0x2412, serdes6:0x2412, serdes7:0x2412, serdes8:0x2412, serdes9:0x2412
TX control 7 register register:
  serdes0:0x1077, serdes1:0x1077, serdes2:0x1077, serdes3:0x1077, serdes4:0x1077
  serdes5:0x1077, serdes6:0x1077, serdes7:0x1077, serdes8:0x1077, serdes9:0x1077
TX control 8 register register:
  serdes0:0xb800, serdes1:0xb800, serdes2:0xb800, serdes3:0xb800, serdes4:0xb800
  serdes5:0xb800, serdes6:0xb800, serdes7:0xb800, serdes8:0xb800, serdes9:0xb800
TX LVDS contrl 1 register register:
  serdes0:0x6050, serdes1:0x6050, serdes2:0x6050, serdes3:0x6050, serdes4:0x6050
  serdes5:0x6050, serdes6:0x6050, serdes7:0x6050, serdes8:0x6050, serdes9:0x6050
TX LVDS contrl 2 register register:
  serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
  serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9
TX LVDS contrl 3 register register:
  serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
  serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9
RX control 2 register register:
  serdes0:0x2220, serdes1:0x2220, serdes2:0x2224, serdes3:0x2224, serdes4:0x2222
  serdes5:0x2224, serdes6:0x2220, serdes7:0x2224, serdes8:0x2220, serdes9:0x2224
RX control 3 register register:
  serdes0:0x1631, serdes1:0x1631, serdes2:0x1631, serdes3:0x1631, serdes4:0x1631
  serdes5:0x1631, serdes6:0x1631, serdes7:0x1631, serdes8:0x1631, serdes9:0x1631
RX control 4 register register:
  serdes0:0x60c8, serdes1:0x40c8, serdes2:0x50c8, serdes3:0x50c8, serdes4:0x60c8
  serdes5:0x50c8, serdes6:0x50c8, serdes7:0x50c8, serdes8:0x60c8, serdes9:0x50c8
RX control 6 register register:
  serdes0:0x081a, serdes1:0x081a, serdes2:0x081a, serdes3:0x081a, serdes4:0x081a
  serdes5:0x081a, serdes6:0x081a, serdes7:0x081a, serdes8:0x081a, serdes9:0x081a
RX control 7 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 8 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 9 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX LVDS contrl 1 register register:
  serdes0:0x0bfa, serdes1:0x0bba, serdes2:0x0bba, serdes3:0x0bba, serdes4:0x0bba
  serdes5:0x0bba, serdes6:0x0bba, serdes7:0x0bba, serdes8:0x0bba, serdes9:0x0bba

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CFP Registers:

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NVR 1 Registers:

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(Reg 0x8000=0x0e) (Reg 0x8001=0x95) (Reg 0x8002=0x01) (Reg 0x8003=0x01)
(Reg 0x8004=0x00) (Reg 0x8005=0x00) (Reg 0x8006=0x00) (Reg 0x8007=0x00)
(Reg 0x8008=0x08) (Reg 0x8009=0x4a) (Reg 0x800a=0x11) (Reg 0x800b=0x81)
(Reg 0x800c=0x34) (Reg 0x800d=0x0a) (Reg 0x800e=0x00) (Reg 0x800f=0x00)
(Reg 0x8010=0x01) (Reg 0x8011=0x04) (Reg 0x8012=0xca) (Reg 0x8013=0x45)
(Reg 0x8014=0xcc) (Reg 0x8015=0xb8) (Reg 0x8016=0x08) (Reg 0x8017=0x34)
(Reg 0x8018=0x21) (Reg 0x8019=0x44) (Reg 0x801a=0x40) (Reg 0x801b=0x70)
(Reg 0x801c=0x1c) (Reg 0x801d=0x73) (Reg 0x801e=0x64) (Reg 0x801f=0x46)
(Reg 0x8020=0x00) (Reg 0x8021=0x46) (Reg 0x8022=0x49) (Reg 0x8023=0x4e)
(Reg 0x8024=0x49) (Reg 0x8025=0x53) (Reg 0x8026=0x41) (Reg 0x8027=0x52)
(Reg 0x8028=0x20) (Reg 0x8029=0x43) (Reg 0x802a=0x4f) (Reg 0x802b=0x52)
(Reg 0x802c=0x50) (Reg 0x802d=0x2e) (Reg 0x802e=0x20) (Reg 0x802f=0x20)
(Reg 0x8030=0x20) (Reg 0x8031=0x00) (Reg 0x8032=0x90) (Reg 0x8033=0x65)

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```
(Reg 0x8034=0x46) (Reg 0x8035=0x54) (Reg 0x8036=0x4c) (Reg 0x8037=0x43)
(Reg 0x8038=0x31) (Reg 0x8039=0x31) (Reg 0x803a=0x38) (Reg 0x803b=0x31)
(Reg 0x803c=0x52) (Reg 0x803d=0x44) (Reg 0x803e=0x4e) (Reg 0x803f=0x53)
(Reg 0x8040=0x2d) (Reg 0x8041=0x43) (Reg 0x8042=0x31) (Reg 0x8043=0x20)
(Reg 0x8044=0x43) (Reg 0x8045=0x32) (Reg 0x8046=0x32) (Reg 0x8047=0x43)
(Reg 0x8048=0x53) (Reg 0x8049=0x4c) (Reg 0x804a=0x41) (Reg 0x804b=0x20)
(Reg 0x804c=0x20) (Reg 0x804d=0x20) (Reg 0x804e=0x20) (Reg 0x804f=0x20)
(Reg 0x8050=0x20) (Reg 0x8051=0x20) (Reg 0x8052=0x20) (Reg 0x8053=0x20)
(Reg 0x8054=0x32) (Reg 0x8055=0x30) (Reg 0x8056=0x31) (Reg 0x8057=0x30)
(Reg 0x8058=0x30) (Reg 0x8059=0x36) (Reg 0x805a=0x30) (Reg 0x805b=0x32)
(Reg 0x805c=0x30) (Reg 0x805d=0x30) (Reg 0x805e=0x49) (Reg 0x805f=0x50)
(Reg 0x8060=0x55) (Reg 0x8061=0x49) (Reg 0x8062=0x42) (Reg 0x8063=0x48)
(Reg 0x8064=0x43) (Reg 0x8065=0x52) (Reg 0x8066=0x41) (Reg 0x8067=0x41)
(Reg 0x8068=0x0a) (Reg 0x8069=0x0c) (Reg 0x806a=0x01) (Reg 0x806b=0x02)
(Reg 0x806c=0x01) (Reg 0x806d=0x04) (Reg 0x806e=0x0c) (Reg 0x806f=0x03)
(Reg 0x8070=0x0f) (Reg 0x8071=0x68) (Reg 0x8072=0x0f) (Reg 0x8073=0x01)
(Reg 0x8074=0x01) (Reg 0x8075=0x00) (Reg 0x8076=0x00) (Reg 0x8077=0x00)
(Reg 0x8078=0x00) (Reg 0x8079=0x00) (Reg 0x807a=0x00) (Reg 0x807b=0x00)
(Reg 0x807c=0x00) (Reg 0x807d=0x00) (Reg 0x807e=0x00) (Reg 0x807f=0x1a)
```

NVR 2 Registers:

```
(Reg 0x8080=0x46) (Reg 0x8081=0x00) (Reg 0x8082=0x44) (Reg 0x8083=0x00)
(Reg 0x8084=0x02) (Reg 0x8085=0x00) (Reg 0x8086=0x00) (Reg 0x8087=0x00)
(Reg 0x8088=0x87) (Reg 0x8089=0x5a) (Reg 0x808a=0x86) (Reg 0x808b=0x10)
(Reg 0x808c=0x7b) (Reg 0x808d=0xc0) (Reg 0x808e=0x7a) (Reg 0x808f=0x75)
(Reg 0x8090=0x00) (Reg 0x8091=0x00) (Reg 0x8092=0x00) (Reg 0x8093=0x00)
(Reg 0x8094=0x00) (Reg 0x8095=0x00) (Reg 0x8096=0x00) (Reg 0x8097=0x00)
(Reg 0x8098=0x00) (Reg 0x8099=0x00) (Reg 0x809a=0x00) (Reg 0x809b=0x00)
(Reg 0x809c=0x00) (Reg 0x809d=0x00) (Reg 0x809e=0x00) (Reg 0x809f=0x00)
(Reg 0x80a0=0x00) (Reg 0x80a1=0x00) (Reg 0x80a2=0x00) (Reg 0x80a3=0x00)
(Reg 0x80a4=0x00) (Reg 0x80a5=0x00) (Reg 0x80a6=0x00) (Reg 0x80a7=0x00)
(Reg 0x80a8=0xea) (Reg 0x80a9=0x60) (Reg 0x80aa=0xe0) (Reg 0x80ab=0x9c)
(Reg 0x80ac=0x44) (Reg 0x80ad=0x5c) (Reg 0x80ae=0x3a) (Reg 0x80af=0x98)
(Reg 0x80b0=0x6e) (Reg 0x80b1=0x17) (Reg 0x80b2=0x62) (Reg 0x80b3=0x1e)
(Reg 0x80b4=0x10) (Reg 0x80b5=0x48) (Reg 0x80b6=0x0e) (Reg 0x80b7=0x83)
(Reg 0x80b8=0x37) (Reg 0x80b9=0x00) (Reg 0x80ba=0x35) (Reg 0x80bb=0x00)
(Reg 0x80bc=0x1b) (Reg 0x80bd=0x00) (Reg 0x80be=0x19) (Reg 0x80bf=0x00)
(Reg 0x80c0=0x6e) (Reg 0x80c1=0x17) (Reg 0x80c2=0x62) (Reg 0x80c3=0x1e)
(Reg 0x80c4=0x01) (Reg 0x80c5=0xf5) (Reg 0x80c6=0x00) (Reg 0x80c7=0xfb)
(Reg 0x80c8=0x00) (Reg 0x80c9=0x00) (Reg 0x80ca=0x00) (Reg 0x80cb=0x00)
(Reg 0x80cc=0x00) (Reg 0x80cd=0x00) (Reg 0x80ce=0x00) (Reg 0x80cf=0x00)
(Reg 0x80d0=0x00) (Reg 0x80d1=0x00) (Reg 0x80d2=0x00) (Reg 0x80d3=0x00)
(Reg 0x80d4=0x00) (Reg 0x80d5=0x00) (Reg 0x80d6=0x00) (Reg 0x80d7=0x00)
(Reg 0x80d8=0x00) (Reg 0x80d9=0x00) (Reg 0x80da=0x00) (Reg 0x80db=0x00)
(Reg 0x80dc=0x00) (Reg 0x80dd=0x00) (Reg 0x80de=0x00) (Reg 0x80df=0x00)
(Reg 0x80e0=0x00) (Reg 0x80e1=0x00) (Reg 0x80e2=0x00) (Reg 0x80e3=0x00)
(Reg 0x80e4=0x00) (Reg 0x80e5=0x00) (Reg 0x80e6=0x00) (Reg 0x80e7=0x00)
(Reg 0x80e8=0x00) (Reg 0x80e9=0x00) (Reg 0x80ea=0x00) (Reg 0x80eb=0x00)
(Reg 0x80ec=0x00) (Reg 0x80ed=0x00) (Reg 0x80ee=0x00) (Reg 0x80ef=0x00)
(Reg 0x80f0=0x00) (Reg 0x80f1=0x00) (Reg 0x80f2=0x00) (Reg 0x80f3=0x00)
(Reg 0x80f4=0x00) (Reg 0x80f5=0x00) (Reg 0x80f6=0x00) (Reg 0x80f7=0x00)
(Reg 0x80f8=0x00) (Reg 0x80f9=0x00) (Reg 0x80fa=0x00) (Reg 0x80fb=0x00)
(Reg 0x80fc=0x00) (Reg 0x80fd=0x00) (Reg 0x80fe=0x00) (Reg 0x80ff=0xe9)
```

NVR 3 Registers:

```
(Reg 0x8100=0x00) (Reg 0x8101=0x00) (Reg 0x8102=0x00) (Reg 0x8103=0x00)
(Reg 0x8104=0x00) (Reg 0x8105=0x00) (Reg 0x8106=0x00) (Reg 0x8107=0x00)
(Reg 0x8108=0x00) (Reg 0x8109=0x00) (Reg 0x810a=0x00) (Reg 0x810b=0x00)
(Reg 0x810c=0x00) (Reg 0x810d=0x00) (Reg 0x810e=0x00) (Reg 0x810f=0x00)
(Reg 0x8110=0x00) (Reg 0x8111=0x00) (Reg 0x8112=0x00) (Reg 0x8113=0x00)
(Reg 0x8114=0x00) (Reg 0x8115=0x00) (Reg 0x8116=0x00) (Reg 0x8117=0x00)
(Reg 0x8118=0x00) (Reg 0x8119=0x00) (Reg 0x811a=0x00) (Reg 0x811b=0x00)
(Reg 0x811c=0x00) (Reg 0x811d=0x00) (Reg 0x811e=0x00) (Reg 0x811f=0x00)
(Reg 0x8120=0x00) (Reg 0x8121=0x00) (Reg 0x8122=0x00) (Reg 0x8123=0x00)
(Reg 0x8124=0x00) (Reg 0x8125=0x00) (Reg 0x8126=0x00) (Reg 0x8127=0x00)
(Reg 0x8128=0x00) (Reg 0x8129=0x00) (Reg 0x812a=0x00) (Reg 0x812b=0x00)
(Reg 0x812c=0x00) (Reg 0x812d=0x00) (Reg 0x812e=0x00) (Reg 0x812f=0x00)
(Reg 0x8130=0x00) (Reg 0x8131=0x00) (Reg 0x8132=0x00) (Reg 0x8133=0x00)
(Reg 0x8134=0x00) (Reg 0x8135=0x00) (Reg 0x8136=0x00) (Reg 0x8137=0x00)
(Reg 0x8138=0x00) (Reg 0x8139=0x00) (Reg 0x813a=0x00) (Reg 0x813b=0x00)
(Reg 0x813c=0x00) (Reg 0x813d=0x00) (Reg 0x813e=0x00) (Reg 0x813f=0x00)
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show controllers (Ethernet)

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(Reg 0x8140=0x00) (Reg 0x8141=0x00) (Reg 0x8142=0x00) (Reg 0x8143=0x00)
(Reg 0x8144=0x00) (Reg 0x8145=0x00) (Reg 0x8146=0x00) (Reg 0x8147=0x00)
(Reg 0x8148=0x00) (Reg 0x8149=0x00) (Reg 0x814a=0x00) (Reg 0x814b=0x00)
(Reg 0x814c=0x00) (Reg 0x814d=0x00) (Reg 0x814e=0x00) (Reg 0x814f=0x00)
(Reg 0x8150=0x00) (Reg 0x8151=0x00) (Reg 0x8152=0x00) (Reg 0x8153=0x00)
(Reg 0x8154=0x00) (Reg 0x8155=0x00) (Reg 0x8156=0x00) (Reg 0x8157=0x00)
(Reg 0x8158=0x00) (Reg 0x8159=0x00) (Reg 0x815a=0x00) (Reg 0x815b=0x00)
(Reg 0x815c=0x00) (Reg 0x815d=0x00) (Reg 0x815e=0x00) (Reg 0x815f=0x00)
(Reg 0x8160=0x00) (Reg 0x8161=0x00) (Reg 0x8162=0x00) (Reg 0x8163=0x00)
(Reg 0x8164=0x00) (Reg 0x8165=0x00) (Reg 0x8166=0x00) (Reg 0x8167=0x00)
(Reg 0x8168=0x00) (Reg 0x8169=0x00) (Reg 0x816a=0x00) (Reg 0x816b=0x00)
(Reg 0x816c=0x00) (Reg 0x816d=0x00) (Reg 0x816e=0x00) (Reg 0x816f=0x00)
(Reg 0x8170=0x00) (Reg 0x8171=0x00) (Reg 0x8172=0x00) (Reg 0x8173=0x00)
(Reg 0x8174=0x00) (Reg 0x8175=0x00) (Reg 0x8176=0x00) (Reg 0x8177=0x00)
(Reg 0x8178=0x00) (Reg 0x8179=0x00) (Reg 0x817a=0x00) (Reg 0x817b=0x00)
(Reg 0x817c=0x00) (Reg 0x817d=0x00) (Reg 0x817e=0x00) (Reg 0x817f=0x00)
```

NVR 4 Registers:

```
(Reg 0x8180=0x00)
```

Vendor NVR1 Registers

```
(Reg 0x8400=0x00) (Reg 0x8401=0x00) (Reg 0x8402=0x00) (Reg 0x8403=0x00)
(Reg 0x8404=0x00) (Reg 0x8405=0x00) (Reg 0x8406=0x00) (Reg 0x8407=0x00)
(Reg 0x8408=0x00) (Reg 0x8409=0x00) (Reg 0x840a=0x00) (Reg 0x840b=0x00)
(Reg 0x840c=0x00) (Reg 0x840d=0x00) (Reg 0x840e=0x00) (Reg 0x840f=0x00)
(Reg 0x8410=0x43) (Reg 0x8411=0x49) (Reg 0x8412=0x53) (Reg 0x8413=0x43)
(Reg 0x8414=0x4f) (Reg 0x8415=0x20) (Reg 0x8416=0x20) (Reg 0x8417=0x20)
(Reg 0x8418=0x20) (Reg 0x8419=0x20) (Reg 0x841a=0x20) (Reg 0x841b=0x20)
(Reg 0x841c=0x20) (Reg 0x841d=0x20) (Reg 0x841e=0x20) (Reg 0x841f=0x20)
(Reg 0x8420=0x43) (Reg 0x8421=0x46) (Reg 0x8422=0x50) (Reg 0x8423=0x2d)
(Reg 0x8424=0x31) (Reg 0x8425=0x30) (Reg 0x8426=0x30) (Reg 0x8427=0x47)
(Reg 0x8428=0x2d) (Reg 0x8429=0x4c) (Reg 0x842a=0x52) (Reg 0x842b=0x34)
(Reg 0x842c=0x20) (Reg 0x842d=0x20) (Reg 0x842e=0x20) (Reg 0x842f=0x20)
(Reg 0x8430=0x56) (Reg 0x8431=0x45) (Reg 0x8432=0x53) (Reg 0x8433=0x31)
(Reg 0x8434=0x32) (Reg 0x8435=0x46) (Reg 0x8436=0x4e) (Reg 0x8437=0x53)
(Reg 0x8438=0x31) (Reg 0x8439=0x34) (Reg 0x843a=0x32) (Reg 0x843b=0x32)
(Reg 0x843c=0x31) (Reg 0x843d=0x50) (Reg 0x843e=0x44) (Reg 0x843f=0x58)
(Reg 0x8440=0x31) (Reg 0x8441=0x30) (Reg 0x8442=0x2d) (Reg 0x8443=0x32)
(Reg 0x8444=0x35) (Reg 0x8445=0x34) (Reg 0x8446=0x39) (Reg 0x8447=0x2d)
(Reg 0x8448=0x30) (Reg 0x8449=0x31) (Reg 0x844a=0x20) (Reg 0x844b=0x20)
(Reg 0x844c=0x30) (Reg 0x844d=0x31) (Reg 0x844e=0x20) (Reg 0x844f=0x20)
(Reg 0x8450=0x00) (Reg 0x8451=0x00) (Reg 0x8452=0x00) (Reg 0x8453=0x00)
(Reg 0x8454=0x00) (Reg 0x8455=0x00) (Reg 0x8456=0x00) (Reg 0x8457=0x00)
(Reg 0x8458=0x00) (Reg 0x8459=0x00) (Reg 0x845a=0x00) (Reg 0x845b=0x00)
(Reg 0x845c=0x00) (Reg 0x845d=0x00) (Reg 0x845e=0x00) (Reg 0x845f=0x00)
(Reg 0x8460=0x00) (Reg 0x8461=0x00) (Reg 0x8462=0x00) (Reg 0x8463=0x00)
(Reg 0x8464=0x00) (Reg 0x8465=0x00) (Reg 0x8466=0x00) (Reg 0x8467=0x00)
(Reg 0x8468=0x00) (Reg 0x8469=0x00) (Reg 0x846a=0x00) (Reg 0x846b=0x00)
(Reg 0x846c=0x00) (Reg 0x846d=0x00) (Reg 0x846e=0x00) (Reg 0x846f=0x00)
(Reg 0x8470=0x00) (Reg 0x8471=0x00) (Reg 0x8472=0x00) (Reg 0x8473=0x00)
(Reg 0x8474=0x00) (Reg 0x8475=0x00) (Reg 0x8476=0x00) (Reg 0x8477=0x00)
(Reg 0x8478=0x00) (Reg 0x8479=0x00) (Reg 0x847a=0x00) (Reg 0x847b=0x00)
(Reg 0x847c=0x00) (Reg 0x847d=0x00) (Reg 0x847e=0x00) (Reg 0x847f=0x1d)
```

VR 1 Registers:

```
(Reg 0xa000=0x0000) (Reg 0xa001=0x0000) (Reg 0xa002=0x0000) (Reg 0xa003=0x0000)
(Reg 0xa004=0x0000) (Reg 0xa005=0x0003) (Reg 0xa006=0x0002) (Reg 0xa007=0x0001)
(Reg 0xa008=0x0003) (Reg 0xa009=0x0002) (Reg 0xa00a=0x0001) (Reg 0xa00b=0x0000)
(Reg 0xa00c=0x0000) (Reg 0xa00d=0x0000) (Reg 0xa00e=0x0000) (Reg 0xa00f=0x0000)
(Reg 0xa010=0x000e) (Reg 0xa011=0x0200) (Reg 0xa012=0x0000) (Reg 0xa013=0x0000)
(Reg 0xa014=0x0000) (Reg 0xa015=0x0000) (Reg 0xa016=0x0020) (Reg 0xa017=0x0000)
(Reg 0xa018=0x0000) (Reg 0xa019=0x0000) (Reg 0xa01a=0x0000) (Reg 0xa01b=0x0000)
(Reg 0xa01c=0x0000) (Reg 0xa01d=0x0003) (Reg 0xa01e=0x0000) (Reg 0xa01f=0x0000)
(Reg 0xa020=0x0000) (Reg 0xa021=0x0000) (Reg 0xa022=0x0000) (Reg 0xa023=0x0000)
(Reg 0xa024=0x0000) (Reg 0xa025=0x0000) (Reg 0xa026=0x0000) (Reg 0xa027=0x0000)
(Reg 0xa028=0x0040) (Reg 0xa029=0x8070) (Reg 0xa02a=0x0062) (Reg 0xa02b=0x0999)
(Reg 0xa02c=0x0099) (Reg 0xa02d=0x0000) (Reg 0xa02e=0x0000) (Reg 0xa02f=0x26a6)
(Reg 0xa030=0x7cc3) (Reg 0xa031=0x0000) (Reg 0xa032=0x0000) (Reg 0xa033=0x0000)
(Reg 0xa034=0x0000) (Reg 0xa035=0x0000) (Reg 0xa036=0x0000) (Reg 0xa037=0x0000)
(Reg 0xa038=0x0000) (Reg 0xa039=0x0000) (Reg 0xa03a=0x0000)
```

NETWORK LANE VR 1 Registers:

(Reg 0xa200=0x0000)	(Reg 0xa201=0x0000)	(Reg 0xa202=0x0000)	(Reg 0xa203=0x0000)
(Reg 0xa204=0x0000)	(Reg 0xa205=0x0000)	(Reg 0xa206=0x0000)	(Reg 0xa207=0x0000)
(Reg 0xa208=0x0000)	(Reg 0xa209=0x0000)	(Reg 0xa20a=0x0000)	(Reg 0xa20b=0x0000)
(Reg 0xa20c=0x0000)	(Reg 0xa20d=0x0000)	(Reg 0xa20e=0x0000)	(Reg 0xa20f=0x0000)
(Reg 0xa210=0x0000)	(Reg 0xa211=0x0000)	(Reg 0xa212=0x0000)	(Reg 0xa213=0x0000)
(Reg 0xa214=0x0000)	(Reg 0xa215=0x0000)	(Reg 0xa216=0x0000)	(Reg 0xa217=0x0000)
(Reg 0xa218=0x0000)	(Reg 0xa219=0x0000)	(Reg 0xa21a=0x0000)	(Reg 0xa21b=0x0000)
(Reg 0xa21c=0x0000)	(Reg 0xa21d=0x0000)	(Reg 0xa21e=0x0000)	(Reg 0xa21f=0x0000)
(Reg 0xa220=0x0000)	(Reg 0xa221=0x0000)	(Reg 0xa222=0x0000)	(Reg 0xa223=0x0000)
(Reg 0xa224=0x0000)	(Reg 0xa225=0x0000)	(Reg 0xa226=0x0000)	(Reg 0xa227=0x0000)
(Reg 0xa228=0x0000)	(Reg 0xa229=0x0000)	(Reg 0xa22a=0x0000)	(Reg 0xa22b=0x0000)
(Reg 0xa22c=0x0000)	(Reg 0xa22d=0x0000)	(Reg 0xa22e=0x0000)	(Reg 0xa22f=0x0000)
(Reg 0xa230=0x0000)	(Reg 0xa231=0x0000)	(Reg 0xa232=0x0000)	(Reg 0xa233=0x0000)
(Reg 0xa234=0x0000)	(Reg 0xa235=0x0000)	(Reg 0xa236=0x0000)	(Reg 0xa237=0x0000)
(Reg 0xa238=0x0000)	(Reg 0xa239=0x0000)	(Reg 0xa23a=0x0000)	(Reg 0xa23b=0x0000)
(Reg 0xa23c=0x0000)	(Reg 0xa23d=0x0000)	(Reg 0xa23e=0x0000)	(Reg 0xa23f=0x0000)
(Reg 0xa240=0x9999)	(Reg 0xa241=0x9999)	(Reg 0xa242=0x9999)	(Reg 0xa243=0x9999)
(Reg 0xa244=0x0000)	(Reg 0xa245=0x0000)	(Reg 0xa246=0x0000)	(Reg 0xa247=0x0000)
(Reg 0xa248=0x0000)	(Reg 0xa249=0x0000)	(Reg 0xa24a=0x0000)	(Reg 0xa24b=0x0000)
(Reg 0xa24c=0x0000)	(Reg 0xa24d=0x0000)	(Reg 0xa24e=0x0000)	(Reg 0xa24f=0x0000)
(Reg 0xa250=0xe058)	(Reg 0xa251=0xe058)	(Reg 0xa252=0xe058)	(Reg 0xa253=0xe058)
(Reg 0xa254=0x0000)	(Reg 0xa255=0x0000)	(Reg 0xa256=0x0000)	(Reg 0xa257=0x0000)
(Reg 0xa258=0x0000)	(Reg 0xa259=0x0000)	(Reg 0xa25a=0x0000)	(Reg 0xa25b=0x0000)
(Reg 0xa25c=0x0000)	(Reg 0xa25d=0x0000)	(Reg 0xa25e=0x0000)	(Reg 0xa25f=0x0000)
(Reg 0xa260=0x0000)			

NETWORK LANE VR 2 Registers:

(Reg 0xa280=0x0000)	(Reg 0xa281=0x0000)	(Reg 0xa282=0x0000)	(Reg 0xa283=0x0000)
(Reg 0xa284=0x0000)	(Reg 0xa285=0x0000)	(Reg 0xa286=0x0000)	(Reg 0xa287=0x0000)
(Reg 0xa288=0x0000)	(Reg 0xa289=0x0000)	(Reg 0xa28a=0x0000)	(Reg 0xa28b=0x0000)
(Reg 0xa28c=0x0000)	(Reg 0xa28d=0x0000)	(Reg 0xa28e=0x0000)	(Reg 0xa28f=0x0000)
(Reg 0xa290=0x0000)	(Reg 0xa291=0x0000)	(Reg 0xa292=0x0000)	(Reg 0xa293=0x0000)
(Reg 0xa294=0x0000)	(Reg 0xa295=0x0000)	(Reg 0xa296=0x0000)	(Reg 0xa297=0x0000)
(Reg 0xa298=0x0000)	(Reg 0xa299=0x0000)	(Reg 0xa29a=0x0000)	(Reg 0xa29b=0x0000)
(Reg 0xa29c=0x0000)	(Reg 0xa29d=0x0000)	(Reg 0xa29e=0x0000)	(Reg 0xa29f=0x0000)
(Reg 0xa2a0=0xb766)	(Reg 0xa2a1=0x98aa)	(Reg 0xa2a2=0x922b)	(Reg 0xa2a3=0x882c)
(Reg 0xa2a4=0x0000)	(Reg 0xa2a5=0x0000)	(Reg 0xa2a6=0x0000)	(Reg 0xa2a7=0x0000)
(Reg 0xa2a8=0x0000)	(Reg 0xa2a9=0x0000)	(Reg 0xa2aa=0x0000)	(Reg 0xa2ab=0x0000)
(Reg 0xa2ac=0x0000)	(Reg 0xa2ad=0x0000)	(Reg 0xa2ae=0x0000)	(Reg 0xa2af=0x0000)
(Reg 0xa2b0=0x3238)	(Reg 0xa2b1=0x364a)	(Reg 0xa2b2=0x38b5)	(Reg 0xa2b3=0x39c7)
(Reg 0xa2b4=0x0000)	(Reg 0xa2b5=0x0000)	(Reg 0xa2b6=0x0000)	(Reg 0xa2b7=0x0000)
(Reg 0xa2b8=0x0000)	(Reg 0xa2b9=0x0000)	(Reg 0xa2ba=0x0000)	(Reg 0xa2bb=0x0000)
(Reg 0xa2bc=0x0000)	(Reg 0xa2bd=0x0000)	(Reg 0xa2be=0x0000)	(Reg 0xa2bf=0x0000)
(Reg 0xa2c0=0x2fc0)	(Reg 0xa2c1=0x2fae)	(Reg 0xa2c2=0x2fc0)	(Reg 0xa2c3=0x2fd1)
(Reg 0xa2c4=0x0000)	(Reg 0xa2c5=0x0000)	(Reg 0xa2c6=0x0000)	(Reg 0xa2c7=0x0000)
(Reg 0xa2c8=0x0000)	(Reg 0xa2c9=0x0000)	(Reg 0xa2ca=0x0000)	(Reg 0xa2cb=0x0000)
(Reg 0xa2cc=0x0000)	(Reg 0xa2cd=0x0000)	(Reg 0xa2ce=0x0000)	(Reg 0xa2cf=0x0000)
(Reg 0xa2d0=0x2b06)	(Reg 0xa2d1=0x3579)	(Reg 0xa2d2=0x3462)	(Reg 0xa2d3=0x3867)
(Reg 0xa2d4=0x0000)	(Reg 0xa2d5=0x0000)	(Reg 0xa2d6=0x0000)	(Reg 0xa2d7=0x0000)
(Reg 0xa2d8=0x0000)	(Reg 0xa2d9=0x0000)	(Reg 0xa2da=0x0000)	(Reg 0xa2db=0x0000)
(Reg 0xa2dc=0x0000)	(Reg 0xa2dd=0x0000)	(Reg 0xa2de=0x0000)	(Reg 0xa2df=0x0000)
(Reg 0xa2e0=0x0000)			

HOST LANE VR 1 Registers:

(Reg 0xa400=0x0000)	(Reg 0xa401=0x0000)	(Reg 0xa402=0x0000)	(Reg 0xa403=0x0000)
(Reg 0xa404=0x0000)	(Reg 0xa405=0x0000)	(Reg 0xa406=0x0000)	(Reg 0xa407=0x0000)
(Reg 0xa408=0x0000)	(Reg 0xa409=0x0000)	(Reg 0xa40a=0x0000)	(Reg 0xa40b=0x0000)
(Reg 0xa40c=0x0000)	(Reg 0xa40d=0x0000)	(Reg 0xa40e=0x0000)	(Reg 0xa40f=0x0000)
(Reg 0xa410=0x0000)	(Reg 0xa411=0x0000)	(Reg 0xa412=0x0000)	(Reg 0xa413=0x0000)
(Reg 0xa414=0x0000)	(Reg 0xa415=0x0000)	(Reg 0xa416=0x0000)	(Reg 0xa417=0x0000)
(Reg 0xa418=0x0000)	(Reg 0xa419=0x0000)	(Reg 0xa41a=0x0000)	(Reg 0xa41b=0x0000)
(Reg 0xa41c=0x0000)	(Reg 0xa41d=0x0000)	(Reg 0xa41e=0x0000)	(Reg 0xa41f=0x0000)
(Reg 0xa420=0x0001)	(Reg 0xa421=0x0001)	(Reg 0xa422=0x0001)	(Reg 0xa423=0x0001)
(Reg 0xa424=0x0001)	(Reg 0xa425=0x0001)	(Reg 0xa426=0x0001)	(Reg 0xa427=0x0001)
(Reg 0xa428=0x0001)	(Reg 0xa429=0x0001)	(Reg 0xa42a=0x0000)	(Reg 0xa42b=0x0000)
(Reg 0xa42c=0x0000)	(Reg 0xa42d=0x0000)	(Reg 0xa42e=0x0000)	(Reg 0xa42f=0x0000)
(Reg 0xa430=0x0000)	(Reg 0xa431=0x0000)	(Reg 0xa432=0x0000)	(Reg 0xa433=0x0000)
(Reg 0xa434=0x0000)	(Reg 0xa435=0x0000)	(Reg 0xa436=0x0000)	(Reg 0xa437=0x0000)

```
(Reg 0xa438=0x0000) (Reg 0xa439=0x0000) (Reg 0xa43a=0x0000) (Reg 0xa43b=0x0000)
(Reg 0xa43c=0x0000) (Reg 0xa43d=0x0000) (Reg 0xa43e=0x0000) (Reg 0xa43f=0x0000)
(Reg 0xa440=0x0001) (Reg 0xa441=0x0001) (Reg 0xa442=0x0001) (Reg 0xa443=0x0001)
(Reg 0xa444=0x0001) (Reg 0xa445=0x0001) (Reg 0xa446=0x0001) (Reg 0xa447=0x0001)
(Reg 0xa448=0x0001) (Reg 0xa449=0x0001) (Reg 0xa44a=0x0000) (Reg 0xa44b=0x0000)
(Reg 0xa44c=0x0000) (Reg 0xa44d=0x0000) (Reg 0xa44e=0x0000) (Reg 0xa44f=0x0000)
(Reg 0xa450=0x0000)
```

The following example shows sample output from the **show controllers HundredGigE bert** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 bert
Tue Mar 22 06:01:53.201 UTC
Command not supported on this interface
```

The following example shows sample output from the **show controllers HundredGigE control** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 control
Tue Mar 22 06:02:02.882 UTC
Management information for interface HundredGigE0/3/0/0:
```

```
Port number: 0
Bay number: 0
Interface handle: 0x1380040
```

Config:

```
Auto-negotiation: Configuration not supported (Off)
Carrier delay (up): Not configured
Carrier delay (down): Not configured
Speed: Configuration not supported (100Gbps)
Duplex: Configuration not supported (Full Duplex)
Flow Control: Not configured (None)
IPG: Configuration not supported (standard (12))
Loopback: Not configured (None)
MTU: 9188 bytes
Bandwidth: Not configured
BER-SD Threshold: Configuration not supported
BER-SD Report: Configuration not supported
BER-SF Threshold: Configuration not supported
BER-SF Report: Configuration not supported
BER-SF Signal Remote Failure: Configuration not supported
```

Driver constraints:

```
Min MTU: 64 bytes
Max MTU: 9600 bytes
Max speed: 100Gbps
Interface type: HundredGigE
Management interface: No
Promiscuous mode: Yes
Default carrier delay up (auto-neg on): 0 ms
Default carrier delay down (auto-neg on): 0 ms
Default carrier delay up (auto-neg off): 0 ms
Default carrier delay down (auto-neg off): 0 ms
Allowed config mask: 0x26b
```

Cached driver state:

```
MTU: 9196 bytes
Burnt-in MAC address: 001d.70b6.6810
```

Operational carrier delay:

```
Carrier delay (up): 0 ms
Carrier delay (down): 0 ms
```

Bundle settings:

```
Aggregated: No
Bundle MTU: 1514 bytes
Bundle MAC address: 001d.70b6.6810
```

Port FSM state:

```
Port is enabled, link is up
```

Complete FSM state:

```
Admin up
Bundle admin up
```



```

Client admin up
Client admin tx not disabled
Port enabled
Port tx enabled
Hardware link up
IDB interface state information:
IDB bundle admin up
IDB client admin up
IDB client tx admin up
IDB error disable not set

```

```
0 Unicast MAC Addresses:
```

```
0 Multicast MAC Addresses:
```

```
0 Unicast Bundle MAC Addresses:
```

```
0 Multicast Bundle MAC Addresses:
```

The following example shows sample output from the **show controllers HundredGigE internal** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```

RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 internal
Tue Mar 22 06:02:47.254 UTC
PLIM 1 Port HundredGigE Internal Information:
shmwin pointer: 0x581d4264
shmwin id      : 0x3c
shmwin initlization: complete
shmwin mac stats pointer: 0x603d3020
shmwin mac stats version: 0x1
shmwin ctx pointer: 0x603db07c
shmwin ctx version: 0x1
HW initilization: completed
Maximum CFP power class supported: 4
Maximum CFP power consumption supported: 30000 mW

```

The following example shows sample output from the **show controllers HundredGigE mac** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```

RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 mac
Tue Mar 22 06:02:56.722 UTC

Operational address: 001d.70b6.6810
Burnt-in address: 001d.70b6.6810
MAC state for beluga 0 port 0

```

```
0 HSRP/VRRP MAC addresses
```

```

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP Ethertype: 0x88e7

```

```
4 VLAN UIDB entries
```

VLAN1	VLAN2	Packet Type Flags	UIDB Result Flags
0	0	VLAN	1 VLAN
0	0	ARPA	1 ARPA
0	0	SAP	1 SAP
0	0		1 SNAP

The following example shows sample output from the **show controllers HundredGigE phy** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```

RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 phy
Tue Mar 22 06:03:04.371 UTC

802.3ba PCS
Previous PCS Alarms:
None

Current PCS Status:
PCS is able to support 100GBASE-R
PCS is Block Locked
PCS Rx Link Status is UP
PCS Errored Block Counts: 0

```

show controllers (Ethernet)

PCS BER (Sync Header Error) Counts: 0

PCS detailed information:

RX Service Interface Lane Sync Header Lock Status:

Lane-0 : Locked	Lane-10 : Locked
Lane-1 : Locked	Lane-11 : Locked
Lane-2 : Locked	Lane-12 : Locked
Lane-3 : Locked	Lane-13 : Locked
Lane-4 : Locked	Lane-14 : Locked
Lane-5 : Locked	Lane-15 : Locked
Lane-6 : Locked	Lane-16 : Locked
Lane-7 : Locked	Lane-17 : Locked
Lane-8 : Locked	Lane-18 : Locked
Lane-9 : Locked	Lane-19 : Locked

RX Service Interface Lane Marker Lock Status:

Lane-0 : Locked	Lane-10 : Locked
Lane-1 : Locked	Lane-11 : Locked
Lane-2 : Locked	Lane-12 : Locked
Lane-3 : Locked	Lane-13 : Locked
Lane-4 : Locked	Lane-14 : Locked
Lane-5 : Locked	Lane-15 : Locked
Lane-6 : Locked	Lane-16 : Locked
Lane-7 : Locked	Lane-17 : Locked
Lane-8 : Locked	Lane-18 : Locked
Lane-9 : Locked	Lane-19 : Locked

Mapping of Service Interface Lane and RX PCS Lane:

Rx Service Interface Lane 0	= PCS Lane 11
Rx Service Interface Lane 1	= PCS Lane 1
Rx Service Interface Lane 2	= PCS Lane 0
Rx Service Interface Lane 3	= PCS Lane 12
Rx Service Interface Lane 4	= PCS Lane 10
Rx Service Interface Lane 5	= PCS Lane 3
Rx Service Interface Lane 6	= PCS Lane 4
Rx Service Interface Lane 7	= PCS Lane 14
Rx Service Interface Lane 8	= PCS Lane 2
Rx Service Interface Lane 9	= PCS Lane 13
Rx Service Interface Lane 10	= PCS Lane 15
Rx Service Interface Lane 11	= PCS Lane 7
Rx Service Interface Lane 12	= PCS Lane 5
Rx Service Interface Lane 13	= PCS Lane 16
Rx Service Interface Lane 14	= PCS Lane 9
Rx Service Interface Lane 15	= PCS Lane 6
Rx Service Interface Lane 16	= PCS Lane 8
Rx Service Interface Lane 17	= PCS Lane 17
Rx Service Interface Lane 18	= PCS Lane 18
Rx Service Interface Lane 19	= PCS Lane 19

PCS Lane BIP Error Counters:

Lane-0 : 0	Lane-10 : 0
Lane-1 : 0	Lane-11 : 0
Lane-2 : 0	Lane-12 : 0
Lane-3 : 0	Lane-13 : 0
Lane-4 : 0	Lane-14 : 0
Lane-5 : 0	Lane-15 : 0
Lane-6 : 0	Lane-16 : 0
Lane-7 : 0	Lane-17 : 0
Lane-8 : 0	Lane-18 : 0
Lane-9 : 0	Lane-19 : 0

Total PCS Lane BIP Error Count	: 0
Total PCS Lane Sync Header Error Count	: 0
Total PCS Lane Bad 64/66 Code Count	: 3

Serdes section:

=====

```
None of 10 RX serial inputs detects loss of signal.
All of 10 Tx clock multiplication units are locked.
All of 10 Rx clock/data recovery units are locked.
None of 10 TX FIFO has underflow/overflow condition.
None of 10 RX FIFO has underflow/overflow condition.
```

```
CFP section:
=====
```

CFP General Information:

```
Module Identifier:      CFP
Ethernet Application Code: 100GBASE-LR4
Module State:          Ready
Power Class:           3
Maximum Power Consumption: 23000 mW
```

CFP Vendor Information:

```
Vendor Name:           CISCO-SUMITOMO
Vendor PN:             FTLC1181RDNS-C1
Vendor SN:             C22CSLA
Vendor OUI:            0x0-0x90-0x65
Lot Code:              00
DATE CODE(YYYY/MM/DD): 2010/06/02
CFP MSA Hardware Version: 1.0
CFP MSA MDIO Version:  1.2
Vendor Hardware Version: 1.2
Vendor Firmware Version: 1.4
```

CFP UDI Information:

```
UDI Compliant: Yes
Cisco PID: CFP-100G-LR4
Cisco VID: VES1
```

CFP Cisco Information:

```
Vendor Name: CISCO
Cisco PN   : 10-2549-01   Rev 01
Cisco SN   : FNS14221PDX
```

CFP Detail Information:

Number of lanes supported:

```
Number of network lanes: 4
Number of host lanes   : 10
```

Time required by module:

```
Maximum high-power-up time   : 15 s
Maximum high-power-down time : 0 s
Maximum tx-turn-on time      : 1 s
Maximum tx-turn-off time     : 0 ms
```

Module general control:

```
Soft reset asserted      : No
Soft low power asserted  : No
Soft tx disable asserted : No
Soft program control 3 asserted: No
Soft program control 2 asserted: No
Soft program control 1 asserted: No
Soft global alarm test asserted: No
```

```
Tx disable pin asserted: No
Low power pin asserted : No
Program control 3 pin asserted: Yes
Program control 2 pin asserted: Yes
Program control 1 pin asserted: Yes
```

show controllers (Ethernet)

Module Analog A/D value:

Power supply voltage : 3.1969 V
Temperature : 38.4290 degC

Network lane A/D value:

Lane 0 Tx power: 1.2776 mW (1.1 dBm)
Lane 1 Tx power: 1.3995 mW (1.5 dBm)
Lane 2 Tx power: 1.4517 mW (1.6 dBm)
Lane 3 Tx power: 1.4856 mW (1.7 dBm)

Lane 0 Rx power: 1.1044 mW (0.4 dBm)
Lane 1 Rx power: 1.3834 mW (1.4 dBm)
Lane 2 Rx power: 1.3426 mW (1.3 dBm)
Lane 3 Rx power: 1.4456 mW (1.6 dBm)

Total Tx power : 5.6144 mW (7.5 dBm)
Total Rx power : 5.2760 mW (7.2 dBm)

The following example shows sample output from the **show controllers HundredGigE regs** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 regs
Tue Mar 22 06:03:25.597 UTC
```

PCS 802.3ba Registers:

```
=====
Control 1 = 0x0010
Status 1 = 0x0004
Dev ID 0 = 0x0000 Dev ID 1 = 0x0000
Speed Ability = 0x0008
Devices 1 = 0x0004 Devices 2 = 0x0000
Control 2 = 0x0005
Status 2 = 0x0020
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base R Status 1 = 0x1001
Base R Status 2 = 0x8000
BER high order counter = 0x0000
Errored blocks high order counter = 0x8000
Base R test pattern control = 0x0080
Base R test pattern error counter = 0x0000
Multi-lane BASE-R alignment status 1 = 0x10ff
Multi-lane BASE-R alignment status 2 = 0x0fff
Multi-lane BASE-R alignment status 3 = 0x00ff
Multi-lane BASE-R alignment status 4 = 0x0fff
BIP error counter lane 0 = 0x0000
BIP error counter lane 1 = 0x0000
BIP error counter lane 2 = 0x0000
BIP error counter lane 3 = 0x0000
BIP error counter lane 4 = 0x0000
BIP error counter lane 5 = 0x0000
BIP error counter lane 6 = 0x0000
BIP error counter lane 7 = 0x0000
BIP error counter lane 8 = 0x0000
BIP error counter lane 9 = 0x0000
BIP error counter lane 10 = 0x0000
BIP error counter lane 11 = 0x0000
BIP error counter lane 12 = 0x0000
BIP error counter lane 13 = 0x0000
BIP error counter lane 14 = 0x0000
BIP error counter lane 15 = 0x0000
BIP error counter lane 16 = 0x0000
BIP error counter lane 17 = 0x0000
BIP error counter lane 18 = 0x0000
BIP error counter lane 19 = 0x0000
Lane mapping register 0 = 0x000b
Lane mapping register 1 = 0x0001
Lane mapping register 2 = 0x0000
Lane mapping register 3 = 0x000c
Lane mapping register 4 = 0x000a
Lane mapping register 5 = 0x0003
Lane mapping register 6 = 0x0004
```

```

Lane mapping register 7 = 0x000e
Lane mapping register 8 = 0x0002
Lane mapping register 9 = 0x000d
Lane mapping register 10 = 0x000f
Lane mapping register 11 = 0x0007
Lane mapping register 12 = 0x0005
Lane mapping register 13 = 0x0010
Lane mapping register 14 = 0x0009
Lane mapping register 15 = 0x0006
Lane mapping register 16 = 0x0008
Lane mapping register 17 = 0x0011
Lane mapping register 18 = 0x0012
Lane mapping register 19 = 0x0013

Serdes registers:
=====

Chip id register: 0x8154
Chip revision id register: 0x1
Digital control 1 register register:
    serdes0:0x017a, serdes1:0x017a, serdes2:0x017a, serdes3:0x017a, serdes4:0x017a
    serdes5:0x017a, serdes6:0x017a, serdes7:0x017a, serdes8:0x017a, serdes9:0x017a
Digital control 2 register register:
    serdes0:0x0305, serdes1:0x0305, serdes2:0x0305, serdes3:0x0305, serdes4:0x0305
    serdes5:0x0305, serdes6:0x0305, serdes7:0x0305, serdes8:0x0305, serdes9:0x0305
Digital control 3 register register:
    serdes0:0x0d0f, serdes1:0x0d0f, serdes2:0x0d0f, serdes3:0x0d0f, serdes4:0x0d0f
    serdes5:0x0d0f, serdes6:0x0d0f, serdes7:0x0d0f, serdes8:0x0d0f, serdes9:0x0d0f
Digital control 5 register register:
    serdes0:0x6de0, serdes1:0x6de0, serdes2:0x6de0, serdes3:0x6de0, serdes4:0x6de0
    serdes5:0x6de0, serdes6:0x6de0, serdes7:0x6de0, serdes8:0x6de0, serdes9:0x6de0
Digital status 0 register register:
    serdes0:0x303b, serdes1:0x303b, serdes2:0x303b, serdes3:0x303b, serdes4:0x303b
    serdes5:0x303b, serdes6:0x303b, serdes7:0x303b, serdes8:0x303b, serdes9:0x303b
Line PRBS control register register:
    serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
    serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
Line PRBS status register register:
    serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
    serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
System PRBS control register register:
    serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
    serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
System PRBS status register register:
    serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
    serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
PRBS status 2 register register:
    serdes0:0x8008, serdes1:0x8008, serdes2:0x8008, serdes3:0x8008, serdes4:0x8008
    serdes5:0x8008, serdes6:0x8008, serdes7:0x8008, serdes8:0x8008, serdes9:0x8008
TX control 1 register register:
    serdes0:0x1884, serdes1:0x1884, serdes2:0x1884, serdes3:0x1884, serdes4:0x1884
    serdes5:0x1884, serdes6:0x1884, serdes7:0x1884, serdes8:0x1884, serdes9:0x1884
TX control 2 register register:
    serdes0:0x00a0, serdes1:0x00a0, serdes2:0x00a0, serdes3:0x00a0, serdes4:0x00a0
    serdes5:0x00a0, serdes6:0x00a0, serdes7:0x00a0, serdes8:0x00a0, serdes9:0x00a0
TX control 4 register register:
    serdes0:0x2412, serdes1:0x2412, serdes2:0x2412, serdes3:0x2412, serdes4:0x2412
    serdes5:0x2412, serdes6:0x2412, serdes7:0x2412, serdes8:0x2412, serdes9:0x2412
TX control 7 register register:
    serdes0:0x1077, serdes1:0x1077, serdes2:0x1077, serdes3:0x1077, serdes4:0x1077
    serdes5:0x1077, serdes6:0x1077, serdes7:0x1077, serdes8:0x1077, serdes9:0x1077
TX control 8 register register:
    serdes0:0xb800, serdes1:0xb800, serdes2:0xb800, serdes3:0xb800, serdes4:0xb800
    serdes5:0xb800, serdes6:0xb800, serdes7:0xb800, serdes8:0xb800, serdes9:0xb800
TX LVDS contrl 1 register register:
    serdes0:0x6050, serdes1:0x6050, serdes2:0x6050, serdes3:0x6050, serdes4:0x6050
    serdes5:0x6050, serdes6:0x6050, serdes7:0x6050, serdes8:0x6050, serdes9:0x6050
TX LVDS contrl 2 register register:
    serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
    serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9
TX LVDS contrl 3 register register:
    serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
    serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9

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show controllers (Ethernet)

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RX control 2 register register:
  serdes0:0x2220, serdes1:0x2220, serdes2:0x2224, serdes3:0x2224, serdes4:0x2222
  serdes5:0x2224, serdes6:0x2220, serdes7:0x2224, serdes8:0x2220, serdes9:0x2224
RX control 3 register register:
  serdes0:0x1631, serdes1:0x1631, serdes2:0x1631, serdes3:0x1631, serdes4:0x1631
  serdes5:0x1631, serdes6:0x1631, serdes7:0x1631, serdes8:0x1631, serdes9:0x1631
RX control 4 register register:
  serdes0:0x60c8, serdes1:0x40c8, serdes2:0x50c8, serdes3:0x50c8, serdes4:0x60c8
  serdes5:0x50c8, serdes6:0x50c8, serdes7:0x50c8, serdes8:0x60c8, serdes9:0x50c8
RX control 6 register register:
  serdes0:0x081a, serdes1:0x081a, serdes2:0x081a, serdes3:0x081a, serdes4:0x081a
  serdes5:0x081a, serdes6:0x081a, serdes7:0x081a, serdes8:0x081a, serdes9:0x081a
RX control 7 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 8 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 9 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX LVDS contrl 1 register register:
  serdes0:0x0bfa, serdes1:0x0bba, serdes2:0x0bba, serdes3:0x0bba, serdes4:0x0bba
  serdes5:0x0bba, serdes6:0x0bba, serdes7:0x0bba, serdes8:0x0bba, serdes9:0x0bba

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CFP Registers:
 =====

NVR 1 Registers:

```

(Reg 0x8000=0x0e) (Reg 0x8001=0x95) (Reg 0x8002=0x01) (Reg 0x8003=0x01)
(Reg 0x8004=0x00) (Reg 0x8005=0x00) (Reg 0x8006=0x00) (Reg 0x8007=0x00)
(Reg 0x8008=0x08) (Reg 0x8009=0x4a) (Reg 0x800a=0x11) (Reg 0x800b=0x81)
(Reg 0x800c=0x34) (Reg 0x800d=0x0a) (Reg 0x800e=0x00) (Reg 0x800f=0x00)
(Reg 0x8010=0x01) (Reg 0x8011=0x04) (Reg 0x8012=0xca) (Reg 0x8013=0x45)
(Reg 0x8014=0xcc) (Reg 0x8015=0xb8) (Reg 0x8016=0x08) (Reg 0x8017=0x34)
(Reg 0x8018=0x21) (Reg 0x8019=0x44) (Reg 0x801a=0x40) (Reg 0x801b=0x70)
(Reg 0x801c=0x1c) (Reg 0x801d=0x73) (Reg 0x801e=0x64) (Reg 0x801f=0x46)
(Reg 0x8020=0x00) (Reg 0x8021=0x46) (Reg 0x8022=0x49) (Reg 0x8023=0x4e)
(Reg 0x8024=0x49) (Reg 0x8025=0x53) (Reg 0x8026=0x41) (Reg 0x8027=0x52)
(Reg 0x8028=0x20) (Reg 0x8029=0x43) (Reg 0x802a=0x4f) (Reg 0x802b=0x52)
(Reg 0x802c=0x50) (Reg 0x802d=0x2e) (Reg 0x802e=0x20) (Reg 0x802f=0x20)
(Reg 0x8030=0x20) (Reg 0x8031=0x00) (Reg 0x8032=0x90) (Reg 0x8033=0x65)
(Reg 0x8034=0x46) (Reg 0x8035=0x54) (Reg 0x8036=0x4c) (Reg 0x8037=0x43)
(Reg 0x8038=0x31) (Reg 0x8039=0x31) (Reg 0x803a=0x38) (Reg 0x803b=0x31)
(Reg 0x803c=0x52) (Reg 0x803d=0x44) (Reg 0x803e=0x4e) (Reg 0x803f=0x53)
(Reg 0x8040=0x2d) (Reg 0x8041=0x43) (Reg 0x8042=0x31) (Reg 0x8043=0x20)
(Reg 0x8044=0x43) (Reg 0x8045=0x32) (Reg 0x8046=0x32) (Reg 0x8047=0x43)
(Reg 0x8048=0x53) (Reg 0x8049=0x4c) (Reg 0x804a=0x41) (Reg 0x804b=0x20)
(Reg 0x804c=0x20) (Reg 0x804d=0x20) (Reg 0x804e=0x20) (Reg 0x804f=0x20)
(Reg 0x8050=0x20) (Reg 0x8051=0x20) (Reg 0x8052=0x20) (Reg 0x8053=0x20)
(Reg 0x8054=0x32) (Reg 0x8055=0x30) (Reg 0x8056=0x31) (Reg 0x8057=0x30)
(Reg 0x8058=0x30) (Reg 0x8059=0x36) (Reg 0x805a=0x30) (Reg 0x805b=0x32)
(Reg 0x805c=0x30) (Reg 0x805d=0x30) (Reg 0x805e=0x49) (Reg 0x805f=0x50)
(Reg 0x8060=0x55) (Reg 0x8061=0x49) (Reg 0x8062=0x42) (Reg 0x8063=0x48)
(Reg 0x8064=0x43) (Reg 0x8065=0x52) (Reg 0x8066=0x41) (Reg 0x8067=0x41)
(Reg 0x8068=0x0a) (Reg 0x8069=0x0c) (Reg 0x806a=0x01) (Reg 0x806b=0x02)
(Reg 0x806c=0x01) (Reg 0x806d=0x04) (Reg 0x806e=0x0c) (Reg 0x806f=0x03)
(Reg 0x8070=0x0f) (Reg 0x8071=0x68) (Reg 0x8072=0x0f) (Reg 0x8073=0x01)
(Reg 0x8074=0x01) (Reg 0x8075=0x00) (Reg 0x8076=0x00) (Reg 0x8077=0x00)
(Reg 0x8078=0x00) (Reg 0x8079=0x00) (Reg 0x807a=0x00) (Reg 0x807b=0x00)
(Reg 0x807c=0x00) (Reg 0x807d=0x00) (Reg 0x807e=0x00) (Reg 0x807f=0x1a)

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NVR 2 Registers:

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(Reg 0x8080=0x46) (Reg 0x8081=0x00) (Reg 0x8082=0x44) (Reg 0x8083=0x00)
(Reg 0x8084=0x02) (Reg 0x8085=0x00) (Reg 0x8086=0x00) (Reg 0x8087=0x00)
(Reg 0x8088=0x87) (Reg 0x8089=0x5a) (Reg 0x808a=0x86) (Reg 0x808b=0x10)
(Reg 0x808c=0x7b) (Reg 0x808d=0xc0) (Reg 0x808e=0x7a) (Reg 0x808f=0x75)
(Reg 0x8090=0x00) (Reg 0x8091=0x00) (Reg 0x8092=0x00) (Reg 0x8093=0x00)
(Reg 0x8094=0x00) (Reg 0x8095=0x00) (Reg 0x8096=0x00) (Reg 0x8097=0x00)
(Reg 0x8098=0x00) (Reg 0x8099=0x00) (Reg 0x809a=0x00) (Reg 0x809b=0x00)
(Reg 0x809c=0x00) (Reg 0x809d=0x00) (Reg 0x809e=0x00) (Reg 0x809f=0x00)

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(Reg 0x80a0=0x00) (Reg 0x80a1=0x00) (Reg 0x80a2=0x00) (Reg 0x80a3=0x00)
(Reg 0x80a4=0x00) (Reg 0x80a5=0x00) (Reg 0x80a6=0x00) (Reg 0x80a7=0x00)
(Reg 0x80a8=0xea) (Reg 0x80a9=0x60) (Reg 0x80aa=0xe0) (Reg 0x80ab=0x9c)
(Reg 0x80ac=0x44) (Reg 0x80ad=0x5c) (Reg 0x80ae=0x3a) (Reg 0x80af=0x98)
(Reg 0x80b0=0x6e) (Reg 0x80b1=0x17) (Reg 0x80b2=0x62) (Reg 0x80b3=0x1e)
(Reg 0x80b4=0x10) (Reg 0x80b5=0x48) (Reg 0x80b6=0x0e) (Reg 0x80b7=0x83)
(Reg 0x80b8=0x37) (Reg 0x80b9=0x00) (Reg 0x80ba=0x35) (Reg 0x80bb=0x00)
(Reg 0x80bc=0x1b) (Reg 0x80bd=0x00) (Reg 0x80be=0x19) (Reg 0x80bf=0x00)
(Reg 0x80c0=0x6e) (Reg 0x80c1=0x17) (Reg 0x80c2=0x62) (Reg 0x80c3=0x1e)
(Reg 0x80c4=0x01) (Reg 0x80c5=0xf5) (Reg 0x80c6=0x00) (Reg 0x80c7=0xfb)
(Reg 0x80c8=0x00) (Reg 0x80c9=0x00) (Reg 0x80ca=0x00) (Reg 0x80cb=0x00)
(Reg 0x80cc=0x00) (Reg 0x80cd=0x00) (Reg 0x80ce=0x00) (Reg 0x80cf=0x00)
(Reg 0x80d0=0x00) (Reg 0x80d1=0x00) (Reg 0x80d2=0x00) (Reg 0x80d3=0x00)
(Reg 0x80d4=0x00) (Reg 0x80d5=0x00) (Reg 0x80d6=0x00) (Reg 0x80d7=0x00)
(Reg 0x80d8=0x00) (Reg 0x80d9=0x00) (Reg 0x80da=0x00) (Reg 0x80db=0x00)
(Reg 0x80dc=0x00) (Reg 0x80dd=0x00) (Reg 0x80de=0x00) (Reg 0x80df=0x00)
(Reg 0x80e0=0x00) (Reg 0x80e1=0x00) (Reg 0x80e2=0x00) (Reg 0x80e3=0x00)
(Reg 0x80e4=0x00) (Reg 0x80e5=0x00) (Reg 0x80e6=0x00) (Reg 0x80e7=0x00)
(Reg 0x80e8=0x00) (Reg 0x80e9=0x00) (Reg 0x80ea=0x00) (Reg 0x80eb=0x00)
(Reg 0x80ec=0x00) (Reg 0x80ed=0x00) (Reg 0x80ee=0x00) (Reg 0x80ef=0x00)
(Reg 0x80f0=0x00) (Reg 0x80f1=0x00) (Reg 0x80f2=0x00) (Reg 0x80f3=0x00)
(Reg 0x80f4=0x00) (Reg 0x80f5=0x00) (Reg 0x80f6=0x00) (Reg 0x80f7=0x00)
(Reg 0x80f8=0x00) (Reg 0x80f9=0x00) (Reg 0x80fa=0x00) (Reg 0x80fb=0x00)
(Reg 0x80fc=0x00) (Reg 0x80fd=0x00) (Reg 0x80fe=0x00) (Reg 0x80ff=0xe9)

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NVR 3 Registers:

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(Reg 0x8100=0x00) (Reg 0x8101=0x00) (Reg 0x8102=0x00) (Reg 0x8103=0x00)
(Reg 0x8104=0x00) (Reg 0x8105=0x00) (Reg 0x8106=0x00) (Reg 0x8107=0x00)
(Reg 0x8108=0x00) (Reg 0x8109=0x00) (Reg 0x810a=0x00) (Reg 0x810b=0x00)
(Reg 0x810c=0x00) (Reg 0x810d=0x00) (Reg 0x810e=0x00) (Reg 0x810f=0x00)
(Reg 0x8110=0x00) (Reg 0x8111=0x00) (Reg 0x8112=0x00) (Reg 0x8113=0x00)
(Reg 0x8114=0x00) (Reg 0x8115=0x00) (Reg 0x8116=0x00) (Reg 0x8117=0x00)
(Reg 0x8118=0x00) (Reg 0x8119=0x00) (Reg 0x811a=0x00) (Reg 0x811b=0x00)
(Reg 0x811c=0x00) (Reg 0x811d=0x00) (Reg 0x811e=0x00) (Reg 0x811f=0x00)
(Reg 0x8120=0x00) (Reg 0x8121=0x00) (Reg 0x8122=0x00) (Reg 0x8123=0x00)
(Reg 0x8124=0x00) (Reg 0x8125=0x00) (Reg 0x8126=0x00) (Reg 0x8127=0x00)
(Reg 0x8128=0x00) (Reg 0x8129=0x00) (Reg 0x812a=0x00) (Reg 0x812b=0x00)
(Reg 0x812c=0x00) (Reg 0x812d=0x00) (Reg 0x812e=0x00) (Reg 0x812f=0x00)
(Reg 0x8130=0x00) (Reg 0x8131=0x00) (Reg 0x8132=0x00) (Reg 0x8133=0x00)
(Reg 0x8134=0x00) (Reg 0x8135=0x00) (Reg 0x8136=0x00) (Reg 0x8137=0x00)
(Reg 0x8138=0x00) (Reg 0x8139=0x00) (Reg 0x813a=0x00) (Reg 0x813b=0x00)
(Reg 0x813c=0x00) (Reg 0x813d=0x00) (Reg 0x813e=0x00) (Reg 0x813f=0x00)
(Reg 0x8140=0x00) (Reg 0x8141=0x00) (Reg 0x8142=0x00) (Reg 0x8143=0x00)
(Reg 0x8144=0x00) (Reg 0x8145=0x00) (Reg 0x8146=0x00) (Reg 0x8147=0x00)
(Reg 0x8148=0x00) (Reg 0x8149=0x00) (Reg 0x814a=0x00) (Reg 0x814b=0x00)
(Reg 0x814c=0x00) (Reg 0x814d=0x00) (Reg 0x814e=0x00) (Reg 0x814f=0x00)
(Reg 0x8150=0x00) (Reg 0x8151=0x00) (Reg 0x8152=0x00) (Reg 0x8153=0x00)
(Reg 0x8154=0x00) (Reg 0x8155=0x00) (Reg 0x8156=0x00) (Reg 0x8157=0x00)
(Reg 0x8158=0x00) (Reg 0x8159=0x00) (Reg 0x815a=0x00) (Reg 0x815b=0x00)
(Reg 0x815c=0x00) (Reg 0x815d=0x00) (Reg 0x815e=0x00) (Reg 0x815f=0x00)
(Reg 0x8160=0x00) (Reg 0x8161=0x00) (Reg 0x8162=0x00) (Reg 0x8163=0x00)
(Reg 0x8164=0x00) (Reg 0x8165=0x00) (Reg 0x8166=0x00) (Reg 0x8167=0x00)
(Reg 0x8168=0x00) (Reg 0x8169=0x00) (Reg 0x816a=0x00) (Reg 0x816b=0x00)
(Reg 0x816c=0x00) (Reg 0x816d=0x00) (Reg 0x816e=0x00) (Reg 0x816f=0x00)
(Reg 0x8170=0x00) (Reg 0x8171=0x00) (Reg 0x8172=0x00) (Reg 0x8173=0x00)
(Reg 0x8174=0x00) (Reg 0x8175=0x00) (Reg 0x8176=0x00) (Reg 0x8177=0x00)
(Reg 0x8178=0x00) (Reg 0x8179=0x00) (Reg 0x817a=0x00) (Reg 0x817b=0x00)
(Reg 0x817c=0x00) (Reg 0x817d=0x00) (Reg 0x817e=0x00) (Reg 0x817f=0x00)

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NVR 4 Registers:

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(Reg 0x8180=0x00)
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Vendor NVR1 Registers

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(Reg 0x8400=0x00) (Reg 0x8401=0x00) (Reg 0x8402=0x00) (Reg 0x8403=0x00)
(Reg 0x8404=0x00) (Reg 0x8405=0x00) (Reg 0x8406=0x00) (Reg 0x8407=0x00)
(Reg 0x8408=0x00) (Reg 0x8409=0x00) (Reg 0x840a=0x00) (Reg 0x840b=0x00)
(Reg 0x840c=0x00) (Reg 0x840d=0x00) (Reg 0x840e=0x00) (Reg 0x840f=0x00)
(Reg 0x8410=0x43) (Reg 0x8411=0x49) (Reg 0x8412=0x53) (Reg 0x8413=0x43)
(Reg 0x8414=0x4f) (Reg 0x8415=0x20) (Reg 0x8416=0x20) (Reg 0x8417=0x20)
(Reg 0x8418=0x20) (Reg 0x8419=0x20) (Reg 0x841a=0x20) (Reg 0x841b=0x20)

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show controllers (Ethernet)

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(Reg 0x841c=0x20) (Reg 0x841d=0x20) (Reg 0x841e=0x20) (Reg 0x841f=0x20)
(Reg 0x8420=0x43) (Reg 0x8421=0x46) (Reg 0x8422=0x50) (Reg 0x8423=0x2d)
(Reg 0x8424=0x31) (Reg 0x8425=0x30) (Reg 0x8426=0x30) (Reg 0x8427=0x47)
(Reg 0x8428=0x2d) (Reg 0x8429=0x4c) (Reg 0x842a=0x52) (Reg 0x842b=0x34)
(Reg 0x842c=0x20) (Reg 0x842d=0x20) (Reg 0x842e=0x20) (Reg 0x842f=0x20)
(Reg 0x8430=0x56) (Reg 0x8431=0x45) (Reg 0x8432=0x53) (Reg 0x8433=0x31)
(Reg 0x8434=0x32) (Reg 0x8435=0x46) (Reg 0x8436=0x4e) (Reg 0x8437=0x53)
(Reg 0x8438=0x31) (Reg 0x8439=0x34) (Reg 0x843a=0x32) (Reg 0x843b=0x32)
(Reg 0x843c=0x31) (Reg 0x843d=0x50) (Reg 0x843e=0x44) (Reg 0x843f=0x58)
(Reg 0x8440=0x31) (Reg 0x8441=0x30) (Reg 0x8442=0x2d) (Reg 0x8443=0x32)
(Reg 0x8444=0x35) (Reg 0x8445=0x34) (Reg 0x8446=0x39) (Reg 0x8447=0x2d)
(Reg 0x8448=0x30) (Reg 0x8449=0x31) (Reg 0x844a=0x20) (Reg 0x844b=0x20)
(Reg 0x844c=0x30) (Reg 0x844d=0x31) (Reg 0x844e=0x20) (Reg 0x844f=0x20)
(Reg 0x8450=0x00) (Reg 0x8451=0x00) (Reg 0x8452=0x00) (Reg 0x8453=0x00)
(Reg 0x8454=0x00) (Reg 0x8455=0x00) (Reg 0x8456=0x00) (Reg 0x8457=0x00)
(Reg 0x8458=0x00) (Reg 0x8459=0x00) (Reg 0x845a=0x00) (Reg 0x845b=0x00)
(Reg 0x845c=0x00) (Reg 0x845d=0x00) (Reg 0x845e=0x00) (Reg 0x845f=0x00)
(Reg 0x8460=0x00) (Reg 0x8461=0x00) (Reg 0x8462=0x00) (Reg 0x8463=0x00)
(Reg 0x8464=0x00) (Reg 0x8465=0x00) (Reg 0x8466=0x00) (Reg 0x8467=0x00)
(Reg 0x8468=0x00) (Reg 0x8469=0x00) (Reg 0x846a=0x00) (Reg 0x846b=0x00)
(Reg 0x846c=0x00) (Reg 0x846d=0x00) (Reg 0x846e=0x00) (Reg 0x846f=0x00)
(Reg 0x8470=0x00) (Reg 0x8471=0x00) (Reg 0x8472=0x00) (Reg 0x8473=0x00)
(Reg 0x8474=0x00) (Reg 0x8475=0x00) (Reg 0x8476=0x00) (Reg 0x8477=0x00)
(Reg 0x8478=0x00) (Reg 0x8479=0x00) (Reg 0x847a=0x00) (Reg 0x847b=0x00)
(Reg 0x847c=0x00) (Reg 0x847d=0x00) (Reg 0x847e=0x00) (Reg 0x847f=0x1d)

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VR 1 Registers:

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(Reg 0xa000=0x0000) (Reg 0xa001=0x0000) (Reg 0xa002=0x0000) (Reg 0xa003=0x0000)
(Reg 0xa004=0x0000) (Reg 0xa005=0x0003) (Reg 0xa006=0x0002) (Reg 0xa007=0x0001)
(Reg 0xa008=0x0003) (Reg 0xa009=0x0002) (Reg 0xa00a=0x0001) (Reg 0xa00b=0x0000)
(Reg 0xa00c=0x0000) (Reg 0xa00d=0x0000) (Reg 0xa00e=0x0000) (Reg 0xa00f=0x0000)
(Reg 0xa010=0x000e) (Reg 0xa011=0x0200) (Reg 0xa012=0x0000) (Reg 0xa013=0x0000)
(Reg 0xa014=0x0000) (Reg 0xa015=0x0000) (Reg 0xa016=0x0020) (Reg 0xa017=0x0000)
(Reg 0xa018=0x0000) (Reg 0xa019=0x0000) (Reg 0xa01a=0x0000) (Reg 0xa01b=0x0000)
(Reg 0xa01c=0x0000) (Reg 0xa01d=0x0003) (Reg 0xa01e=0x0000) (Reg 0xa01f=0x0000)
(Reg 0xa020=0x0000) (Reg 0xa021=0x0000) (Reg 0xa022=0x0000) (Reg 0xa023=0x0000)
(Reg 0xa024=0x0000) (Reg 0xa025=0x0000) (Reg 0xa026=0x0000) (Reg 0xa027=0x0000)
(Reg 0xa028=0x0040) (Reg 0xa029=0x8070) (Reg 0xa02a=0x0062) (Reg 0xa02b=0x0999)
(Reg 0xa02c=0x0099) (Reg 0xa02d=0x0000) (Reg 0xa02e=0x0000) (Reg 0xa02f=0x265f)
(Reg 0xa030=0x7cc3) (Reg 0xa031=0x0000) (Reg 0xa032=0x0000) (Reg 0xa033=0x0000)
(Reg 0xa034=0x0000) (Reg 0xa035=0x0000) (Reg 0xa036=0x0000) (Reg 0xa037=0x0000)
(Reg 0xa038=0x0000) (Reg 0xa039=0x0000) (Reg 0xa03a=0x0000)

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NETWORK LANE VR 1 Registers:

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(Reg 0xa200=0x0000) (Reg 0xa201=0x0000) (Reg 0xa202=0x0000) (Reg 0xa203=0x0000)
(Reg 0xa204=0x0000) (Reg 0xa205=0x0000) (Reg 0xa206=0x0000) (Reg 0xa207=0x0000)
(Reg 0xa208=0x0000) (Reg 0xa209=0x0000) (Reg 0xa20a=0x0000) (Reg 0xa20b=0x0000)
(Reg 0xa20c=0x0000) (Reg 0xa20d=0x0000) (Reg 0xa20e=0x0000) (Reg 0xa20f=0x0000)
(Reg 0xa210=0x0000) (Reg 0xa211=0x0000) (Reg 0xa212=0x0000) (Reg 0xa213=0x0000)
(Reg 0xa214=0x0000) (Reg 0xa215=0x0000) (Reg 0xa216=0x0000) (Reg 0xa217=0x0000)
(Reg 0xa218=0x0000) (Reg 0xa219=0x0000) (Reg 0xa21a=0x0000) (Reg 0xa21b=0x0000)
(Reg 0xa21c=0x0000) (Reg 0xa21d=0x0000) (Reg 0xa21e=0x0000) (Reg 0xa21f=0x0000)
(Reg 0xa220=0x0000) (Reg 0xa221=0x0000) (Reg 0xa222=0x0000) (Reg 0xa223=0x0000)
(Reg 0xa224=0x0000) (Reg 0xa225=0x0000) (Reg 0xa226=0x0000) (Reg 0xa227=0x0000)
(Reg 0xa228=0x0000) (Reg 0xa229=0x0000) (Reg 0xa22a=0x0000) (Reg 0xa22b=0x0000)
(Reg 0xa22c=0x0000) (Reg 0xa22d=0x0000) (Reg 0xa22e=0x0000) (Reg 0xa22f=0x0000)
(Reg 0xa230=0x0000) (Reg 0xa231=0x0000) (Reg 0xa232=0x0000) (Reg 0xa233=0x0000)
(Reg 0xa234=0x0000) (Reg 0xa235=0x0000) (Reg 0xa236=0x0000) (Reg 0xa237=0x0000)
(Reg 0xa238=0x0000) (Reg 0xa239=0x0000) (Reg 0xa23a=0x0000) (Reg 0xa23b=0x0000)
(Reg 0xa23c=0x0000) (Reg 0xa23d=0x0000) (Reg 0xa23e=0x0000) (Reg 0xa23f=0x0000)
(Reg 0xa240=0x9999) (Reg 0xa241=0x9999) (Reg 0xa242=0x9999) (Reg 0xa243=0x9999)
(Reg 0xa244=0x0000) (Reg 0xa245=0x0000) (Reg 0xa246=0x0000) (Reg 0xa247=0x0000)
(Reg 0xa248=0x0000) (Reg 0xa249=0x0000) (Reg 0xa24a=0x0000) (Reg 0xa24b=0x0000)
(Reg 0xa24c=0x0000) (Reg 0xa24d=0x0000) (Reg 0xa24e=0x0000) (Reg 0xa24f=0x0000)
(Reg 0xa250=0xe058) (Reg 0xa251=0xe058) (Reg 0xa252=0xe058) (Reg 0xa253=0xe058)
(Reg 0xa254=0x0000) (Reg 0xa255=0x0000) (Reg 0xa256=0x0000) (Reg 0xa257=0x0000)
(Reg 0xa258=0x0000) (Reg 0xa259=0x0000) (Reg 0xa25a=0x0000) (Reg 0xa25b=0x0000)
(Reg 0xa25c=0x0000) (Reg 0xa25d=0x0000) (Reg 0xa25e=0x0000) (Reg 0xa25f=0x0000)
(Reg 0xa260=0x0000)

```

NETWORK LANE VR 2 Registers:


```
(Reg 0xa280=0x0000) (Reg 0xa281=0x0000) (Reg 0xa282=0x0000) (Reg 0xa283=0x0000)
(Reg 0xa284=0x0000) (Reg 0xa285=0x0000) (Reg 0xa286=0x0000) (Reg 0xa287=0x0000)
(Reg 0xa288=0x0000) (Reg 0xa289=0x0000) (Reg 0xa28a=0x0000) (Reg 0xa28b=0x0000)
(Reg 0xa28c=0x0000) (Reg 0xa28d=0x0000) (Reg 0xa28e=0x0000) (Reg 0xa28f=0x0000)
(Reg 0xa290=0x0000) (Reg 0xa291=0x0000) (Reg 0xa292=0x0000) (Reg 0xa293=0x0000)
(Reg 0xa294=0x0000) (Reg 0xa295=0x0000) (Reg 0xa296=0x0000) (Reg 0xa297=0x0000)
(Reg 0xa298=0x0000) (Reg 0xa299=0x0000) (Reg 0xa29a=0x0000) (Reg 0xa29b=0x0000)
(Reg 0xa29c=0x0000) (Reg 0xa29d=0x0000) (Reg 0xa29e=0x0000) (Reg 0xa29f=0x0000)
(Reg 0xa2a0=0xb766) (Reg 0xa2a1=0x98ea) (Reg 0xa2a2=0x91eb) (Reg 0xa2a3=0x882c)
(Reg 0xa2a4=0x0000) (Reg 0xa2a5=0x0000) (Reg 0xa2a6=0x0000) (Reg 0xa2a7=0x0000)
(Reg 0xa2a8=0x0000) (Reg 0xa2a9=0x0000) (Reg 0xa2aa=0x0000) (Reg 0xa2ab=0x0000)
(Reg 0xa2ac=0x0000) (Reg 0xa2ad=0x0000) (Reg 0xa2ae=0x0000) (Reg 0xa2af=0x0000)
(Reg 0xa2b0=0x321d) (Reg 0xa2b1=0x36cb) (Reg 0xa2b2=0x38da) (Reg 0xa2b3=0x3a08)
(Reg 0xa2b4=0x0000) (Reg 0xa2b5=0x0000) (Reg 0xa2b6=0x0000) (Reg 0xa2b7=0x0000)
(Reg 0xa2b8=0x0000) (Reg 0xa2b9=0x0000) (Reg 0xa2ba=0x0000) (Reg 0xa2bb=0x0000)
(Reg 0xa2bc=0x0000) (Reg 0xa2bd=0x0000) (Reg 0xa2be=0x0000) (Reg 0xa2bf=0x0000)
(Reg 0xa2c0=0x2fc0) (Reg 0xa2c1=0x2fd1) (Reg 0xa2c2=0x2fd1) (Reg 0xa2c3=0x2fd1)
(Reg 0xa2c4=0x0000) (Reg 0xa2c5=0x0000) (Reg 0xa2c6=0x0000) (Reg 0xa2c7=0x0000)
(Reg 0xa2c8=0x0000) (Reg 0xa2c9=0x0000) (Reg 0xa2ca=0x0000) (Reg 0xa2cb=0x0000)
(Reg 0xa2cc=0x0000) (Reg 0xa2cd=0x0000) (Reg 0xa2ce=0x0000) (Reg 0xa2cf=0x0000)
(Reg 0xa2d0=0x2b33) (Reg 0xa2d1=0x360a) (Reg 0xa2d2=0x3453) (Reg 0xa2d3=0x37f2)
(Reg 0xa2d4=0x0000) (Reg 0xa2d5=0x0000) (Reg 0xa2d6=0x0000) (Reg 0xa2d7=0x0000)
(Reg 0xa2d8=0x0000) (Reg 0xa2d9=0x0000) (Reg 0xa2da=0x0000) (Reg 0xa2db=0x0000)
(Reg 0xa2dc=0x0000) (Reg 0xa2dd=0x0000) (Reg 0xa2de=0x0000) (Reg 0xa2df=0x0000)
(Reg 0xa2e0=0x0000)
```

HOST LANE VR 1 Registers:

```
(Reg 0xa400=0x0000) (Reg 0xa401=0x0000) (Reg 0xa402=0x0000) (Reg 0xa403=0x0000)
(Reg 0xa404=0x0000) (Reg 0xa405=0x0000) (Reg 0xa406=0x0000) (Reg 0xa407=0x0000)
(Reg 0xa408=0x0000) (Reg 0xa409=0x0000) (Reg 0xa40a=0x0000) (Reg 0xa40b=0x0000)
(Reg 0xa40c=0x0000) (Reg 0xa40d=0x0000) (Reg 0xa40e=0x0000) (Reg 0xa40f=0x0000)
(Reg 0xa410=0x0000) (Reg 0xa411=0x0000) (Reg 0xa412=0x0000) (Reg 0xa413=0x0000)
(Reg 0xa414=0x0000) (Reg 0xa415=0x0000) (Reg 0xa416=0x0000) (Reg 0xa417=0x0000)
(Reg 0xa418=0x0000) (Reg 0xa419=0x0000) (Reg 0xa41a=0x0000) (Reg 0xa41b=0x0000)
(Reg 0xa41c=0x0000) (Reg 0xa41d=0x0000) (Reg 0xa41e=0x0000) (Reg 0xa41f=0x0000)
(Reg 0xa420=0x0001) (Reg 0xa421=0x0001) (Reg 0xa422=0x0001) (Reg 0xa423=0x0001)
(Reg 0xa424=0x0001) (Reg 0xa425=0x0001) (Reg 0xa426=0x0001) (Reg 0xa427=0x0001)
(Reg 0xa428=0x0001) (Reg 0xa429=0x0001) (Reg 0xa42a=0x0000) (Reg 0xa42b=0x0000)
(Reg 0xa42c=0x0000) (Reg 0xa42d=0x0000) (Reg 0xa42e=0x0000) (Reg 0xa42f=0x0000)
(Reg 0xa430=0x0000) (Reg 0xa431=0x0000) (Reg 0xa432=0x0000) (Reg 0xa433=0x0000)
(Reg 0xa434=0x0000) (Reg 0xa435=0x0000) (Reg 0xa436=0x0000) (Reg 0xa437=0x0000)
(Reg 0xa438=0x0000) (Reg 0xa439=0x0000) (Reg 0xa43a=0x0000) (Reg 0xa43b=0x0000)
(Reg 0xa43c=0x0000) (Reg 0xa43d=0x0000) (Reg 0xa43e=0x0000) (Reg 0xa43f=0x0000)
(Reg 0xa440=0x0001) (Reg 0xa441=0x0001) (Reg 0xa442=0x0001) (Reg 0xa443=0x0001)
(Reg 0xa444=0x0001) (Reg 0xa445=0x0001) (Reg 0xa446=0x0001) (Reg 0xa447=0x0001)
(Reg 0xa448=0x0001) (Reg 0xa449=0x0001) (Reg 0xa44a=0x0000) (Reg 0xa44b=0x0000)
(Reg 0xa44c=0x0000) (Reg 0xa44d=0x0000) (Reg 0xa44e=0x0000) (Reg 0xa44f=0x0000)
(Reg 0xa450=0x0000)
```

The following example shows sample output from the **show controllers HundredGigE stats** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 stats
Tue Mar 22 06:04:08.484 UTC
Statistics for interface HundredGigE0/3/0/0 (cached values):
```

```
Ingress:
  Input total bytes          = 73475628362976
  Input good bytes          = 73443591856352

  Input total packets        = 8009121965
  Input 802.1Q frames        = 0
  Input pause frames         = 0
  Input pkts 64 bytes        = 925
  Input pkts 65-127 bytes    = 5220
  Input pkts 128-255 bytes   = 59
  Input pkts 256-511 bytes   = 2
  Input pkts 512-1023 bytes  = 1
  Input pkts 1024-1518 bytes = 4
  Input pkts 1519-Max bytes  = 8009115754
```

show controllers (Ethernet)

```

Input good pkts          = 8009121964
Input unicast pkts       = 8009117183
Input multicast pkts     = 4780
Input broadcast pkts     = 1

Input drop overrun       = 0
Input drop abort         = 0
Input drop invalid VLAN  = 0
Input drop invalid DMAC  = 0
Input drop invalid encap = 0
Input drop other         = 6947

Input error giant        = 0
Input error runt         = 0
Input error jabbers      = 0
Input error fragments    = 0
Input error CRC          = 1
Input error collisions   = 0
Input error symbol       = 3
Input error other        = 0

Input MIB giant          = 0
Input MIB jabber         = 0
Input MIB CRC            = 0

Egress:
Output total bytes       = 70097928185720
Output good bytes        = 70067364389772

Output total packets     = 7640945487
Output 802.1Q frames     = 0
Output pause frames      = 0
Output pkts 64 bytes     = 725
Output pkts 65-127 bytes = 10602
Output pkts 128-255 bytes = 275
Output pkts 256-511 bytes = 5
Output pkts 512-1023 bytes = 0
Output pkts 1024-1518 bytes = 6
Output pkts 1519-Max bytes = 7640933874

Output good pkts         = 7640945487
Output unicast pkts      = 7640941982
Output multicast pkts    = 3501
Output broadcast pkts    = 6

Output drop underrun     = 0
Output drop abort        = 2
Output drop other        = 2373

Output error other       = 0

```

The following example shows sample output from the **show controllers HundredGigE xgxs** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```

RP/0/RP0/CPU0:router# show controllers HundredGigE 0/3/0/0 xgxs
Tue Mar 22 06:04:19.546 UTC
No XGXS present

```

show lldp

To display the global Link Layer Discovery Protocol (LLDP) operational characteristics on the system, use the **show lldp** command in EXEC configuration mode.

show lldp

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **show lldp** command displays the LLDP operational characteristics when LLDP is enabled globally on the system using the **lldp** command. The settings for the following commands are displayed:

- **lldp timer**
- **lldp holdtime**
- **lldp reinit**

Task ID

Task ID	Operation
ethernet-services	read

Examples

The following example shows the default LLDP operational characteristics when LLDP is enabled globally on the system:

```
RP/0/RP0/CPU0:router# show lldp
Wed Apr 13 06:16:45.510 DST
Global LLDP information:
  Status: ACTIVE
  LLDP advertisements are sent every 30 seconds
  LLDP hold time advertised is 120 seconds
  LLDP interface reinitialisation delay is 2 seconds
```

The following example shows the output when LLDP is not enabled globally on the system:

```
RP/0/RP0/CPU0:router# show lldp
Wed Apr 13 06:42:48.221 DST
% LLDP is not enabled
```

Related Commands

Command	Description
lldp, on page 309	Enables LLDP globally for both transmit and receive operation on the system.
lldp timer, on page 315	Specifies the LLDP packet rate.
lldp holdtime, on page 311	Specifies the length of time that information from an LLDP packet should be held by the receiving device before aging and removing it.
lldp reinit, on page 313	Specifies the length of time to delay initialization of LLDP on an interface.

show lldp entry

To display detailed information about LLDP neighbors, use the **show lldp entry** command in EXEC configuration mode.

show lldp entry *{* | name}*

Syntax Description		
	<i>*</i>	Displays detailed information about all LLDP neighbors.
	<i>name</i>	Name of a specific LLDP neighbor for which detailed information is displayed.

Syntax Description This command has no keywords or arguments.

Command Modes EXEC (#)

Command History	Release	Modification
	Release 4.2.3	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operation
	ethernet-services	read

Examples The following example shows sample output for all LLDP neighbor table entries on the system:

```
RP/0/RP0/CPU0:router# show lldp entry *
Wed Apr 13 10:29:40.342 UTC
Capability codes:
  (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
  (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

-----
Local Interface: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8
Port Description: GigabitEthernet0/0/0/8
System Name: asr9k-5

System Description:
```

show lldp entry

```
Cisco IOS XR Software, Version 4.1.0.32I[Default]
Copyright (c) 2011 by Cisco Systems, Inc.
```

```
Time remaining: 102 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses:
  IPv4 address: 10.5.173.110
```

```
-----
Local Interface: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8.1
Port Description: GigabitEthernet0/0/0/8.1
System Name: asr9k-5
```

```
System Description:
Cisco IOS XR Software, Version 4.1.0.32I[Default]
Copyright (c) 2011 by Cisco Systems, Inc.
```

```
Time remaining: 96 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses:
  IPv4 address: 10.5.173.110
```

```
Total entries displayed: 2
```

Related Commands

Command	Description
lldp, on page 309	Enables LLDP globally for both transmit and receive operation on the system.

show lldp errors

To display Link Layer Discovery Protocol (LLDP) error and overflow statistics, use the **show lldp errors** command in EXEC configuration mode.

show lldp errors [*location location*]

Syntax Description

location <i>location</i>	(Optional) Displays information about LLDP neighbors for the specified location. The <i>location</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

Totals of LLDP error and overflow statistics for the system are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
ethernet-services	read

Examples

The following example shows sample output for the **show lldp errors** command:

```
RP/0/RP0/CPU0:router# show lldp errors
Wed Apr 13 06:17:08.321 DST

LLDP errors/overflows:
  Total memory allocation failures: 0
  Total encapsulation failures: 0
  Total input queue overflows: 0
  Total table overflows: 0
```

Related Commands

Command	Description
lldp, on page 309	Enables LLDP globally for both transmit and receive operation on the system.
show lldp traffic, on page 386	Displays statistics for LLDP traffic.

show lldp interface

To display Link Layer Discovery Protocol (LLDP) configuration and status information on an interface, use the **show lldp interface** command in EXEC configuration mode.

show lldp interface [*type interface-path-id* | **location** *location*]

Syntax Description

<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>location</i>	(Optional) Displays information about LLDP neighbors for the specified location. The <i>location</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

LLDP configuration and status information for all interfaces is displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When LLDP is enabled globally on the system, all supported interfaces are automatically enabled for both LLDP receive and transmit operations. You can individually disable interfaces for either LLDP receive or transmit operations using the **receive disable** command or **transmit disable** command in LLDP configuration mode under the interface.

Task ID

Task ID	Operation
ethernet-services	read

Examples

The following example shows sample output for the **show lldp interface** command for the Gigabit Ethernet interface at 0/1/0/7:

```
RP/0/RP0/CPU0:router# show lldp interface gigabitethernet 0/1/0/7
Wed Apr 13 13:22:30.501 DST
```

```
GigabitEthernet0/1/0/7:
  Tx: enabled
  Rx: enabled
  Tx state: IDLE
  Rx state: WAIT FOR FRAME
```

Table 23: show lldp interface Field Descriptions

Field	Description
Tx:	Configuration status of the interface to transmit LLDP advertisements.
Rx:	Configuration status of the interface to receive LLDP advertisements.
Tx state:	Status of the LLDP transmit process on the interface.
Rx state:	Status of the LLDP receive process on the interface.

Related Commands

Command	Description
lldp , on page 309	Enables LLDP globally for both transmit and receive operation on the system.
lldp (interface) , on page 310	Enters LLDP configuration mode.
receive disable	Disables LLDP receive operations on the interface.
transmit disable	Disables LLDP transmit operations on the interface.

show lldp neighbors

To display information about Link Layer Discovery Protocol (LLDP) neighbors, use the **show lldp neighbors** command in EXEC configuration mode.

show lldp neighbors [*type interface-path-id* | **location** *location*] [**detail**]

Syntax Description

<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>location</i>	(Optional) Displays information about LLDP neighbors for the specified location. The <i>location</i> argument is entered in the <i>rack/slot/module</i> notation.
detail	(Optional) Displays all available information about LLDP neighbors.

Command Default

Basic device information for LLDP neighbors is displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To clear the neighbor information displayed by the **show lldp neighbors** command, use the **clear lldp table** command.

Task ID

Task ID	Operation
ethernet-services	read

Examples

The following example show sample output for the **show lldp neighbors** command:

```
RP/0/RP0/CPU0:router# show lldp neighbors
Capability codes:
  (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
  (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Device ID           Local Intf      Hold-time  Capability    Port ID
R1                  Et1/0          150       R             Et1/0

Total entries displayed: 1
```

Table 24: show lldp neighbors Field Descriptions

Field	Description
Device ID	Name of the neighbor device. Note If the device ID has more than 20 characters, the ID will be truncated to 20 characters in command output because of display constraints.
Local Intf	Local interface through which this neighbor is connected.
Hold-time	Amount of time (in seconds) that the local device will hold the LLDP advertisement from a sending device before discarding it.
Capability	The device type of the neighbor, whose values correspond to the characters and definition displayed in the "Capability codes" section.
Port ID	Interface and port number of the neighboring device.

The following example shows sample output for the **show lldp neighbors detail** command:

```
RP/0/RP0/CPU0:router# show lldp neighbors detail
Wed Apr 13 10:29:40.342 UTC
Capability codes:
  (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
  (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

-----
Local Interface: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8
Port Description: GigabitEthernet0/0/0/8
System Name: asr9k-5

System Description:
Cisco IOS XR Software, Version 4.1.0.32I[Default]
Copyright (c) 2011 by Cisco Systems, Inc.

Time remaining: 102 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
```

Management Addresses:
IPv4 address: 10.5.173.110

Local Interface: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8.1
Port Description: GigabitEthernet0/0/0/8.1
System Name: asr9k-5

System Description:
Cisco IOS XR Software, Version 4.1.0.32I[Default]
Copyright (c) 2011 by Cisco Systems, Inc.

Time remaining: 96 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses:
IPv4 address: 10.5.173.110

Total entries displayed: 2

Related Commands

Command	Description
lldp, on page 309	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp, on page 301	Resets LLDP traffic counters or LLDP neighbor information.

show lldp traffic

To display statistics for Link Layer Discovery Protocol (LLDP) traffic, use the **show lldp traffic** command in EXEC configuration mode.

show lldp traffic [**location** *location*]

Syntax Description

location <i>location</i>	(Optional) Displays LLDP statistics for traffic at the specified location. The <i>location</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

Totals of LLDP statistics for the system are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To reset the counters displayed by the **show lldp traffic** command, use the **clear lldp counters** command.

Task ID

Task ID	Operation
ethernet-services	read

Examples

The following example shows sample output for statistics for all LLDP traffic on the system:

```
RP/0/RP0/CPU0:router# show lldp traffic
LLDP traffic statistics:
  Total frames out: 277
  Total entries aged: 0
  Total frames in: 328
  Total frames received in error: 0
  Total frames discarded: 0
  Total TLVs discarded: 0
  Total TLVs unrecognized: 0
```

Table 25: show lldp traffic Field Descriptions

Field	Description
Total frames out:	Number of LLDP advertisements sent from the device.
Total entries aged:	Number of LLDP neighbor entries removed due to expiration of the hold time.
Total frames in:	Number of LLDP advertisements received by the device.
Total frames received in error:	Number of times the LLDP advertisements contained errors of any type.
Total frames discarded:	Number of times the LLDP process discarded an incoming advertisement.
Total TLVs discarded:	Number of times the LLDP process discarded a Type Length Value (TLV) from an LLDP frame.
Total TLVs unrecognized:	Number of TLVs that could not be processed because the content of the TLV was not recognized by the device or the contents of the TLV were incorrectly specified.

Related Commands

Command	Description
lldp , on page 309	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp , on page 301	Resets LLDP traffic counters or LLDP neighbor information.

show mac-accounting (Ethernet)

To display MAC accounting statistics for an interface, use the **show mac-accounting** command in EXEC mode.

show mac-accounting {**GigabitEthernet**|**TenGigE**} *interface-path-id* [**location node-id**]

Syntax Description

{GigabitEthernet TenGigE}	Indicates the type of Ethernet interface whose MAC accounting statistics you want to display. Enter GigabitEthernet , TenGigE .
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location node-id	(Optional) Displays detailed MAC accounting information for the specified interface on the specified node. The <i>node-id</i> argument is entered in the <i>rack/slot/module/port</i> notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.

- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows the output from the **show mac-accounting** command, which displays MAC accounting statistics on the specified interface:

```
RP/0/RP0/CPU0:router# show mac-accounting TenGigE 0/2/0/4 location 0/1/CPU0
TenGigE0/2/0/4
  Input (511 free)
000b.4558.caca: 4 packets, 456 bytes
                Total: 4 packets, 456 bytes
```

Table 26: show mac-accounting Field Descriptions

Field	Description
Interface	The interface from which the statistics are generated.
Input	Heading for the ingress MAC accounting statistics. The number of MAC accounting entries still available is shown in parentheses.
Total	Total statistics for the traffic accounted for by MAC accounting. This excludes any traffic for which there is no MAC address entry, such as non-IP traffic from an unknown MAC source address.

Related Commands

Command	Description
clear mac-accounting (Ethernet), on page 303	Clears MAC accounting statistics for an interface.
mac-accounting, on page 320	Generates accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces.



Ethernet OAM Commands on the Cisco IOS XR Software

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action capabilities-conflict

To configure what action is taken on an interface when a capabilities-conflict event occurs, use the **action capabilities-conflict** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action capabilities-conflict {disable| efd | error-disable-interface| log}

no action capabilities-conflict {disable| efd | error-disable-interface| log}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The efd keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a capabilities-conflict event occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action capabilities-conflict disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a capabilities-conflict event occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action capabilities-conflict efd
```

The following example shows how to configure that the interface is put into the error-disable state when a capabilities-conflict event occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action capabilities-conflict error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a capabilities-conflict event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action capabilities-conflict log
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.

action critical-event

To configure what action is taken on an interface when a critical-event notification is received from the remote Ethernet OAM peer, use the **action critical-event** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action critical-event {**disable**| **error-disable-interface**| **log**}

no action critical-event {**disable**| **error-disable-interface**| **log**}

Syntax Description

disable	Performs no action on the interface when a critical-event notification is received.
error-disable-interface	Puts the interface into the error-disable state when a critical-event notification is received.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a critical-event notification is received. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a critical-event notification is received.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action critical-event disable
```

The following example shows how to configure that the interface is put into the error-disable state when a critical-event notification is received.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action critical-event error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a critical-event notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action critical-event log
```

Related Commands

Command	Description
ethernet oam profile , on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam , on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM) , on page 526	Attaches an Ethernet OAM profile to an interface.

action discovery-timeout

To configure what action is taken on an interface when a connection timeout occurs, use the **action discovery-timeout** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action discovery-timeout {**disable**| **efd error-disable-interface**| **log**}

no action discovery-timeout {**disable**| **efd error-disable-interface**| **log**}

Syntax Description

disable	Performs no action on the interface when a connection timeout occurs.
efd	Puts the line protocol into the down state for an interface when a connection timeout occurs. The state is removed when the session is re-established.
error-disable-interface	Puts the interface into the error-disable state when a connection timeout occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a connection timeout occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The efd keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a connection timeout occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action discovery-timeout disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a connection timeout occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action discovery-timeout efd
```

The following example shows how to configure that the interface is put into the error-disable state when a connection timeout occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action discovery-timeout error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a connection timeout occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action discovery-timeout log
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.

action dying-gasp

To configure what action is taken on an interface when a dying-gasp notification is received from the remote Ethernet OAM peer, use the **action dying-gasp** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action dying-gasp {**disable**| **error-disable-interface**| **log**}

no action dying-gasp {**disable**| **error-disable-interface**| **log**}

Syntax Description

disable	Performs no action on the interface when a dying-gasp notification is received.
error-disable-interface	Puts the interface into the error-disable state when a dying-gasp notification is received.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a dying-gasp notification is received. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a dying-gasp notification is received.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action dying-gasp disable
```

The following example shows how to configure that the interface is put into the error-disable state when a dying-gasp notification is received.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action dying-gasp error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a dying-gasp notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action dying-gasp log
```

Related Commands

Command	Description
ethernet oam profile , on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam , on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM) , on page 526	Attaches an Ethernet OAM profile to an interface.

action high-threshold

To configure what action is taken on an interface when a high threshold is exceeded, use the **action high-threshold** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action high-threshold {**disable**| **error-disable-interface**| **log**}

no action high-threshold {**disable**| **error-disable-interface**| **log**}

Syntax Description

disable	(Interface Ethernet OAM configuration only) Performs no action on the interface when a high threshold is exceeded.
error-disable-interface	Puts the interface into the error-disable state when a high threshold is exceeded.
log	Creates a syslog entry when a high threshold is exceeded. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default is that no action is taken when a high threshold is exceeded.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that a syslog entry is created on the interface when a high threshold is exceeded.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action high-threshold log
```

The following example shows how to configure that the interface is put into the error-disable state when a high threshold is exceeded.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action high-threshold error-disable-interface
```

The following example shows how to configure that no action is taken when a high threshold is exceeded. This configuration overrides the Ethernet OAM profile configuration.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action high-threshold disable
```

Related Commands

Command	Description
ethernet oam profile , on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam , on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM) , on page 526	Attaches an Ethernet OAM profile to an interface.

action remote-loopback

To configure what action is taken on an interface when a remote-loopback event occurs, use the **action remote-loopback** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action remote-loopback {disable| log}

no action remote-loopback {disable| log}

Syntax Description

disable	Performs no action on the interface when a remote-loopback event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a remote-loopback event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a remote-loopback event occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
```

```
RP/0/RP0/CPU0:router(config-eoam)# action remote-loopback disable
```

The following example shows how to configure that a syslog entry is created when a remote-loopback event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action remote-loopback log
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.

action session-down

To configure what action is taken on an interface when an Ethernet OAM session goes down, use the **action session-down** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action session-down {**disable**|**efd** | **error-disable-interface**| **log**}

no action session-down {**disable**|**efd** | **error-disable-interface**| **log**}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The efd keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when an Ethernet OAM session goes down.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action session-down disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when an Ethernet OAM session goes down.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action session-down efd
```

The following example shows how to configure that the interface is put into the error-disable state when an Ethernet OAM session goes down.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action session-down error-disable-interface
```

The following example shows how to configure that a syslog entry is created when an Ethernet OAM session goes down. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action session-down log
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.

action session-up

To configure what action is taken on an interface when an Ethernet OAM session is established, use the **action session-up** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action session-up {disable| log}

no action session-up {disable| log}

Syntax Description

disable	Performs no action on the interface when an Ethernet OAM session is established.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when an Ethernet OAM session is established. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when an Ethernet OAM session is established.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
```

```
RP/0/RP0/CPU0:router(config-eoam) # action session-up disable
```

The following example shows how to configure that a syslog entry is created when an Ethernet OAM session is established. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action session-up log
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.

action uni-directional link-fault

To configure what action is taken on an interface when a link-fault notification is received from the remote Ethernet OAM peer, use the **action uni-directional link-fault** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action uni-directional link-fault {disable| efd | error-disable-interface| log}

no action uni-directional link-fault {disable| efd | error-disable-interface| log}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 4.0.0	This command was introduced.
	This command replaces the action link-fault command.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command only determines the action taken when a uni-directional link fault notification is received from the peer; it does not affect the action taken when a fault is detected locally.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a link-fault notification is received.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action uni-directional link-fault disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a link-fault notification is received.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action uni-directional link-fault efd
```

The following example shows how to configure that the interface is put into the error-disable state when a link-fault notification is received.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action uni-directional link-fault error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a link-fault notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# action uni-directional link-fault log
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.

action wiring-conflict

To configure what action is taken on an interface when a wiring-conflict event occurs, use the **action wiring-conflict** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action wiring-conflict {**disable**| **efd** | **error-disable-interface**| **log**}

no action wiring-conflict {**disable**| **efd** | **error-disable-interface**| **log**}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to put the interface into error-disable state.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The efd keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a wiring-conflict event occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action wiring-conflict disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a wiring-conflict event occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action wiring-conflict efd
```

The following example shows how to configure that a syslog entry is created when a wiring-conflict event occurs.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# action wiring-conflict log
```

The following example shows how to configure that the interface is put into the error-disable state when a wiring-conflict event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
(config-if-eoam)# action wiring-conflict error-disable-interface
```

Related Commands

Command	Description
ethernet oam profile , on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam , on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM) , on page 526	Attaches an Ethernet OAM profile to an interface.

aggregate

To configure the size and number of bins into which to aggregate the results of statistics collection, use the **aggregate** command in SLA profile statistics configuration mode. To return to the default, use the **no** form of this command.

aggregate {**bins** *count* **width** *width*| **none**}

no aggregate {**bins** *count* **width** *width*| **none**}

Syntax Description

bins <i>count</i>	Number of bins. The range is 2 to 100.
width <i>width</i>	For delay and jitter measurements, the size of each bin in milliseconds (range 1-10000). In addition, the width must be specified if the number of bins is at least 2, regardless of the type of measurement.
none	No aggregation is performed. All samples are stored individually.

Command Default

For delay measurements, all collected statistics are aggregated into one bin.

Command Modes

SLA profile statistics configuration (config-sla-prof-stat-cfg)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Changing the aggregation for a given metric clears all stored data for that metric.

When aggregation is enabled, a number of bins are created, each of which represents a range of values. Instead of storing each individual result, all that is stored is a counter of the number of results that fall within the range for each bin. This uses much less memory than storing each individual result.

For delay and jitter measurements, the first bin starts at 0, each bin covers a range of values defined by the specified width, except for the last bin which ends at infinity. For example, an aggregate bin count of 4 and a width of 20 for delay measurements yields 4 bins of statistics for these sample ranges:

- Bin 1—Samples with delay ranges 0 to < 20 ms.
- Bin 2—Samples with delay ranges greater than or equal to 20 and < 40 ms.

- Bin 3—Samples with delay ranges greater than or equal to 40 and < 60 ms.
- Bin 4—Samples with delay ranges 60 ms or greater (unbounded).

**Note**

The lower bound of each bin is inclusive, while the upper bound is exclusive. Changing the aggregation for a given metric clears all stored data for that metric.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure round-trip-delay statistics measurement in 4 bins each with a range of 20 milliseconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RP0/CPU0:router(config-sla-prof-stat-cfg)# aggregate bins 4 width 20
```

ais transmission

To configure Alarm Indication Signal (AIS) transmission for a Connectivity Fault Management (CFM) domain service, use the **ais transmission** command in CFM domain service configuration mode. To disable AIS transmission in a CFM domain service, use the no form of this command.

ais transmission [**interval** **1s**| **1m**] [**cos** *cos*]

no ais transmission [**interval** **1s**| **1m**] [**cos** *cos*]

Syntax Description

interval	(Optional) Interval at which AIS packets are transmitted. Valid values are: • 1s – Interval of 1 second • 1m – Interval of 1 minute
cos <i>cos</i>	(Optional) Specifies the Class of Service (CoS) for the AIS packets. Valid values are 0 to 7.

Command Default

AIS transmission is disabled by default.

If **interval** is not specified, the default interval is 1 second.

If **cos** is not specified, each MEP uses its own CoS value, inherited from the interface.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command enables AIS for all MEPs in the service. AIS messages are triggered by the following events:

- Detection of a CCM defect.
- Detection of a missing peer MEP (when cross-check is configured).
- Receipt of AIS or LCK messages.
- Detection of interface down events (for down MEPs only).

AIS messages are transmitted in the opposite direction of CCMs and other CFM messages that are sent by the MEP. Therefore, up MEPs send AIS messages out of the interface, whereas down MEPs send AIS messages toward the bridging function.

In addition, AIS messages are sent at a higher maintenance level than other CFM messages sent by the MEP:

- If there is a higher-level MEP on the interface in the same direction (up MEP or down MEP), then the AIS messages are passed internally to this higher level MEP. In this case, no AIS messages are actually transmitted (unless the higher-level MEP is also in a service with AIS transmission configured).
- If there is a MIP on the interface, then AIS messages are sent at the level of the MIP.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure Alarm Indication Signal (AIS) transmission for a CFM domain service:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# ais transmission interval 1m cos 7
```

Related Commands

Command	Description
log ais, on page 497	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 419	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais, on page 548	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 556	Displays information about local MEPs.

ais transmission up

To configure Alarm Indication Signal (AIS) transmission on a Connectivity Fault Management (CFM) interface, use the **ais transmission up** command in interface CFM configuration mode. To disable AIS transmission on an interface, use the no form of this command.

ais transmission up [*interval 1s*| *1m*] [*cos cos*]

no ais transmission up [*interval 1s*| *1m*] [*cos cos*]

Syntax Description

interval	(Optional) Interval at which AIS packets are transmitted. Valid values are: • 1s – Interval of 1 second • 1m – Interval of 1 minute
cos cos	(Optional) Specifies the Class of Service (CoS) for the AIS packets. Valid values are 0 to 7.

Command Default

AIS transmission is disabled by default.

If **interval** is not specified, the default interval is 1 second.

If **cos** is not specified, each MEP uses its own CoS value, inherited from the interface.

Command Modes

Interface CFM configuration (config-if-cfm)

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

AIS transmission packets for CFM can be configured only on interfaces with no down MEPs. AIS packets are transmitted only if a MIP exists on the interface and the line protocol state is down. AIS messages are transmitted up, toward the bridging function (same direction as an up MEP sends CCMs), and they are transmitted at the level of the MIP.

If AIS transmission is configured on an interface with any down MEPs, the configuration is ignored, and an error is displayed in the **show ethernet cfm configuration-errors** command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure AIS transmission on a CFM interface.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/2
RP/0/RP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0/CPU0:router(config-if-cfm)# ais transmission up interval 1m cos 7
```

Related Commands

Command	Description
ais transmission, on page 417	Configures AIS transmission for a CFM domain service.
log ais, on page 497	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
show ethernet cfm interfaces ais, on page 548	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 556	Displays information about local MEPS.

buckets archive

To configure the number of buckets to store in memory, use the **buckets archive** command in SLA profile statistics configuration mode. To return to the default value, use the no form of this command.

buckets archive *number*

Syntax Description

<i>number</i>	Number of buckets to store. The range is 1 to 100.

Command Default

The default number of buckets stored in memory is 100.

Command Modes

SLA profile statistics configuration (config-sla-prof-stat-cfg)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The results stored in the oldest bucket are discarded when the limit is reached, to make room for new results. If the number of archived buckets for a given metric decreases, the oldest buckets are deleted and the remaining buckets are untouched. If the number archived buckets for a given metric increases, the newest buckets are filled when the data is collected. See the Usage Guidelines in the [buckets size, on page 423](#) command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the number of buckets to store in memory:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RP0/CPU0:router(config-sla-prof-stat-cfg)# buckets archive 50
```

Related Commands

Command	Description
buckets size, on page 423	Configures the size of the buckets in which statistics are collected.

buckets size

To configure the size of the buckets in which statistics are collected, use the **buckets size** command in SLA profile statistics configuration mode. To return the **buckets size** to the default value, use the no form of this command.

buckets size *number* {**probes**}

no buckets size *number* {**probes**}

Syntax Description

<i>number</i>	Specifies the size of each bucket. The number of probes that each buckets may contain. The range is 1 to 100.
probes	Buckets span multiple probes.

Command Default

1 probe per bucket is collected.

Command Modes

SLA profile statistics configuration mode (config-sla-prof-stat-cfg)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

A bucket represents a time period during which statistics are collected. All the results received during that time period are recorded in the corresponding bucket. If aggregation is enabled, each bucket has its own set of bins and counters, and only results received during the time period represented by the bucket are included in those counters.

By default, there is a separate bucket for each probe. The time period is determined by how long the probe lasts (configured by the [probe](#), on page 525, [send \(SLA\)](#), on page 536, and [schedule \(SLA\)](#), on page 532 commands). This command allows you to modify the size of buckets so that you can have more buckets per probe, or fewer buckets per probe (fewer buckets allows the results from multiple probes to be included in the same bucket).



Note

Changing the size of the buckets for a given metric clears all stored data for that metric. All existing buckets are deleted and new buckets are created.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure the size of the buckets in which statistics are collected.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RP0/CPU0:router(config-sla-prof-stat-cfg)# buckets size 100 per-probe
```

Related Commands

Command	Description
buckets archive, on page 421	Configures the number of buckets to store in memory.
probe, on page 525	Enters SLA profile probe configuration mode.
schedule (SLA), on page 532	
send (SLA), on page 536	Configures the number and timing of packets sent by a probe in an operations profile.

clear ethernet cfm ccm-learning-database location

To clear the Continuity Check Message (CCM) learning database, use the **clear ethernet cfm ccm-learning-database location** command in EXEC mode.

clear ethernet cfm ccm-learning-database location {**all**| *node-id*}

Syntax Description

all	Clears the CCM learning database for all interfaces.
<i>node-id</i>	Clears the CCM learning database for the designated node, entered in <i>r ack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all the CFM CCM learning databases on all interfaces:

```
RP/0/RP0/CPU0:router# clear ethernet cfm ccm-learning-database location all
```

Related Commands

Command	Description
show ethernet cfm ccm-learning-database , on page 544	Displays the CCM learning database.

clear ethernet cfm interface statistics

To clear the counters for an Ethernet CFM interface, use the **clear ethernet cfm interface statistics** command in EXEC mode.

clear ethernet cfm interface *interface-path-id* **statistics** [**location** {**all**| **location**}]

clear ethernet cfm interface statistics location {**all**| *node-id*}

Syntax Description

<i>interface-path-id</i>	(Optional) Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location	(Optional only when used with a specified interface) Clears MAC accounting statistics for a designated interface or for all interfaces.
all	Clears CFM counters for all interfaces.
<i>node-id</i>	Clears CFM counters for a specified interface, using <i>rack/slot/module</i> notation.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all the CFM counters from all interfaces:

```
RP/0/RP0/CPU0:router# clear ethernet cfm interface statistics location all
```

Related Commands

Command	Description
show ethernet cfm interfaces statistics, on page 551	Displays the per-interface counters for CFM.

clear ethernet cfm local meps

To clear the counters for all MEPs or a specified MEP, use the **clear ethernet cfm local meps** command in EXEC mode.

clear ethernet cfm local meps [**all** | **domain** *domain-name* [**all** | **service** *service-name* [**all** | **mep-id** *id*]] | **interface** *interface-name* [**all** | **domain** *domain-name*]]

Syntax Description

all	Clears counters for all local MEPs.
domain <i>domain-name</i>	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. Note For more information about the syntax, use the question mark (?) online help function.
service <i>service-name</i>	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
mep-id <i>id</i>	Maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface <i>interface-name</i>	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The following counters are cleared:

- Number of continuity-check messages (CCMs) sent
- Number of CCMs received
- Number of CCMs received out of sequence
- Number of CCMs received, but discarded due to the **maximum-meps** limit

- Number of loopback messages (LBMs), used for CFM ping
- Number of loopback replies (LBRs), used for CFM ping, sent and received
- Number of LBRs received out of sequence
- Number of LBRs received with bad data (such as LBRs containing padding which does not match the padding sent in the corresponding LBM)
- Number of alarm indication signal (AIS) messages sent and received
- Number of lock (LCK) messages received

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear counters for all MEPs:

```
RP/0/RP0/CPU0:router# clear ethernet cfm local meps all
```

Related Commands

Command	Description
show ethernet cfm local meps , on page 556	Displays information about local MEPs.

clear ethernet cfm peer meps

To clear all peer MEPs or peer MEPs for a specified local MEP, use the **clear ethernet cfm peer meps** command in EXEC mode.

clear ethernet cfm peer meps {**all**| **domain** *domain-name* {**all**| **service** *service-name* {**all**| **local mep-id** *id* } }| **interface** *interface-name* {**all**| **domain** *domain-name* } }

all	Clears counters for all peer MEPs.
domain <i>domain-name</i>	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. Note For more information about the syntax, use the question mark (?) online help function.
service <i>service-name</i>	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance end points belong.
local mep-id <i>id</i>	Local maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface <i>interface-name</i>	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command removes all received CCMs and corresponding peer MEPs from the database (other than those configured with cross-check). The peer MEPs will be added again when the next CCM is received.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all peer MEPs:

```
RP/0/RP0/CPU0:router# clear ethernet cfm peer meps all
```

Related Commands

Command	Description
show ethernet cfm peer meps , on page 562	Displays information about maintenance end points (MEPs) for peer MEPs.

clear ethernet cfm traceroute-cache

To remove the contents of the traceroute cache, use the **clear ethernet cfm traceroute-cache** command in EXEC mode.

clear ethernet cfm traceroute-cache {**all**| **domain** *domain-name* {**all**| **service** *service-name* {**all**| **mep-id** *id*}}| **interface** *interface-name* {**all**| **domain** *domain-name*}}

Syntax Description

domain <i>domain-name</i>	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. Note For more information about the syntax, use the question mark (?) online help function.
service <i>service-name</i>	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance end points belong.
mep-id <i>id</i>	Maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface <i>interface-name</i>	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all ethernet cfm traceroute-cache:

```
RP/0/RP0/CPU0:router# clear ethernet cfm traceroute-cache all
```

Related Commands

Command	Description
traceroute cache , on page 607	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
show ethernet cfm traceroute-cache , on page 569	Displays the contents of the traceroute cache.

clear ethernet oam statistics

To clear the packet counters on Ethernet OAM interfaces, use the **clear ethernet oam statistics** command in EXEC mode.

clear ethernet oam statistics [*interface type interface-path-id*] **location** *node-id* **all**]

Syntax Description

interface type <i>interface-path-id</i>	(Optional) Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location	Clears the statistics for a specific node. For more information about the syntax for the router, use the question mark (?) online help function.
<i>node-id</i>	Path ID of the node.
all	Clears the statistics for all nodes on the router.

Command Default

No parameters clears the packet counters on all Ethernet OAM interfaces.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear the packet counters on a specific interface:

```
RP/0/RP0/CPU0:router# clear ethernet oam statistics interface gigabitethernet 0/1/5/1
```

Related Commands

Command	Description
show ethernet oam statistics, on page 585	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 582	

clear ethernet sla statistics all

To delete the contents of buckets containing SLA statistics collected by all operations probes, including on-demand operations, use the **clear ethernet sla statistics all** command in EXEC mode.

clear ethernet sla statistics [**current**| **history**] **all**

Syntax Description

current	(Optional) Clears statistics for buckets currently being filled for all operations.
history	(Optional) Clears statistics for full buckets for all operations.
all	Clears statistics for all operations.

Command Default

When **current** or **history** are not used, all buckets (current, old, new, half empty, and full) for all operations (including on-demand operations) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

See the Usage Guidelines in the [buckets size, on page 423](#) command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to delete the contents of all buckets containing SLA metrics collected by all probes:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics all
```


The following example shows how to delete the contents of all current buckets containing SLA metrics collected by all probes:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics current all
```

The following example shows how to delete the contents of all full buckets containing SLA metrics collected by all probes:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics history all
```

clear ethernet sla statistics on-demand

To delete the contents of buckets containing SLA statistics collected by on-demand probes, use the **clear ethernet sla statistics on-demand** command in EXEC mode.

clear ethernet sla statistics [**current**|**history**] **on-demand** {**all**|*id*} [**interface type** *interface-path-id* **domain** **all**|**interface type** *interface-path-id* **domain** *domain-name* **target** {**all**|**mac-address** *H.H.H*|**mep-id** *id*}|**interface all domain** *domain-name*]

Syntax Description

current	(Optional) Clears statistics for all buckets currently being filled.
history	(Optional) Clears statistics for all full buckets.
all	Clears statistics for all on-demand operations.
<i>id</i>	Clears statistics for the on-demand operation of the specified number.
interface type	(Optional) Clears statistics for the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
domain all	Clears statistics for on-demand operations for all domains.
domain <i>domain-name</i>	Clears statistics for on-demand operations for the specified domain.
target all	Clears statistics for on-demand operations targeted to all MEPs for the specified interface domain.
target mac-address <i>H.H.H</i>	Clears statistics for on-demand operations targeted to the specified MAC address.
target mep-id <i>id</i>	Clears statistics for on-demand operations targeted to the specified MEP ID.
interface all	(Optional) Clears statistics for on-demand operations on all interfaces.

Command Default

When **current** or **history** are not used, all buckets for on-demand operations (current, old, new, half empty, and full) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

See the Usage Guidelines in the [buckets size, on page 423](#) command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to delete the contents of all buckets currently being filled for the on-demand operation with ID 1:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics current on-demand 1
```

The following example shows how to delete the contents of all buckets for all on-demand operations:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics on-demand all
```

The following example shows how to delete the contents of all buckets for all on-demand operations on a specified interface and domain that is targeted to a specific MEP:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics on-demand all interface TenGigE 0/6/1/0
domain D1 target mep-id 3
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 436	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
ethernet sla on-demand operation type cfm-delay-measurement probe, on page 470	Executes an on-demand Ethernet SLA operation probe for CFM delay measurement.
ethernet sla on-demand operation type cfm-loopback probe, on page 477	Executes an on-demand Ethernet SLA operation probe for CFM loopback measurements
show ethernet sla operations, on page 589	Displays information about configured Ethernet SLA operations.

Command	Description
show ethernet sla statistics, on page 592	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

clear ethernet sla statistics profile

To delete the contents of buckets containing SLA statistics collected by probes for a profile, use the **clear ethernet sla statistics profile** command in EXEC mode.

clear ethernet sla statistics [**current**| **history**] **profile** {**all**| *profile-name*} [**interface type interface-path-id domain all**| **interface type interface-path-id domain domain-name target** {**all**| **mac-address H.H.H**| **mep-id id**}| **interface all domain domain-name**]

Syntax Description

current	(Optional) Clears statistics for all buckets currently being filled.
history	(Optional) Clears statistics for all full buckets.
<i>profile-name</i>	Clears statistics for the specified profile name.
all	Clears statistics for all profiles.
interface type	(Optional) Clears statistics for the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
domain all	Clears statistics for on-demand operations for all domains.
domain domain-name	Clears statistics for on-demand operations for the specified domain.
target all	Clears statistics for on-demand operations targeted to all MEPs for the specified interface domain.
target mac-address H.H.H	Clears statistics for on-demand operations targeted to the specified MAC address.
target mep-id id	Clears statistics for on-demand operations targeted to the specified MEP ID.
interface all	(Optional) Clears statistics for on-demand operations on all interfaces.

Command Default

When **current** or **history** are not used, all buckets in the profile (current, old, new, half empty, and full) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

See the Usage Guidelines in the [buckets size, on page 423](#) command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to delete the contents of all buckets currently being filled for a specified profile:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics current profile P1
```

The following example shows how to delete the contents of all full buckets for a specified profile:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics history profile P2
```

The following example shows how to delete the contents of all buckets for a specified profile:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics profile P3
```

The following example shows how to delete the contents of all buckets for all profiles:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics profile all
```

The following example shows how to delete the contents of all buckets for all profiles on a specified interface and domain that is targeted to a specific MEP:

```
RP/0/RP0/CPU0:router# clear ethernet sla statistics profile all interface TenGigE 0/6/1/0
domain D1 target mep-id 3
```

Related Commands

Command	Description
buckets size, on page 423	Configures the size of the buckets in which statistics are collected.

connection timeout

To configure the timeout value for an Ethernet OAM session, use the **connection timeout** command in Ethernet OAM configuration mode.

connection timeout *seconds*

Syntax Description

<i>seconds</i>	Connection timeout period in seconds. The range is 2 to 30.

Command Default

The default value is 5.

Command Modes

Ethernet OAM configuration (config-eoam)
Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If no packets are received from the OAM peer in the specified time, the OAM session is brought down, and the negotiation phase starts again.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the connection timeout value of an Ethernet OAM session:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# connection timeout 20
```

Related Commands

Command	Description
action discovery-timeout, on page 399	Configures what action is taken on an interface when a connection timeout occurs.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 579	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam interfaces, on page 582	

continuity-check archive hold-time

To configure the time limit for how long peer maintenance-end-points (MEPs) are held in the continuity-check database after they have timed out (no more CCMs are received), use the **continuity-check archive hold-time** command in CFM domain service configuration mode. To return to the default value, use the no form of this command.

continuity-check archive hold-time *minutes*

no continuity-check archive hold-time *minutes*

Syntax Description

<i>minutes</i>	Time limit (in minutes) that peer MEPs are held in the continuity-check database before they are cleared. Range is 1 to 65535.

Command Default

The default is 100.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Peer MEPs appear in **show ethernet cfm peer meps** command display output after they timeout (no more continuity check messages (CCMs) are received).

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the time limit for how long continuity-check messages are held in the continuity-check archive:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
```

```
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# continuity-check archive hold-time 100
```

Related Commands

Command	Description
show ethernet cfm peer meps, on page 562	Displays information about maintenance end points (MEPs) for peer MEPs.

continuity-check interval

To enable continuity check and configure the time interval at which continuity-check messages are transmitted or to set the threshold limit for when a MEP is declared down, use the **continuity-check interval** command in CFM domain service configuration mode. To disable continuity check, use the **no** form of this command.

continuity-check interval *time* [**loss-threshold** *threshold*]

no continuity-check interval *time* [**loss-threshold** *threshold*]

Syntax Description

<i>time</i>	Interval at which continuity-check messages are transmitted. Valid values are: • 100ms: 100 milliseconds • 1s: 1 second • 10s: 10 seconds • 1m: 1 minute • 10m: 10 minutes
loss-threshold <i>threshold</i>	(Optional) Specifies the number of continuity-check messages that are lost before CFM declares that a MEP is down (unreachable). Range is 2 to 255. Used in conjunction with interval .

Command Default

Continuity check is off by default.

If **loss-threshold** is not specified, the default is 3.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the time interval at which continuity-check messages are transmitted and set the threshold limit for when a MEP is declared down.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# continuity-check interval 100ms loss-threshold
10
```

continuity-check loss auto-traceroute

To configure automatic triggering of a traceroute when a MEP is declared down, use the **continuity-check loss auto-traceroute** command in CFM domain service configuration mode. To disable automatic triggering of a traceroute, use the no form of this command.

continuity-check loss auto-traceroute

no continuity-check loss auto-traceroute

This command has no keywords or arguments.

Command Default

Auto-trigger is off.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The results of the traceroute can be seen using the **show ethernet cfm traceroute-cache** command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure automatic triggering of a traceroute when a MEP is declared down:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# continuity-check loss auto-traceroute
```

Related Commands

Command	Description
show ethernet cfm traceroute-cache , on page 569	Displays the contents of the traceroute cache.

cos (CFM)

To configure the class of service (CoS) for all CFM packets generated by the maintenance end point (MEP) on an interface, use the **cos** command in interface CFM MEP configuration mode. To return to the default CoS, use the no form of this command.

cos *cos*

no cos *cos*

Syntax Description

<i>cos</i>	Class of Service for this MEP. The range is 0 to 7.

Command Default

When not configured, the default CoS value is inherited from the Ethernet interface.

Command Modes

Interface CFM MEP configuration (config-if-cfm-mep)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Configuring the class of service (CoS) on maintenance end points (MEPs) is supported on all Ethernet interfaces. The specified CoS value is used for all CFM messages transmitted by the MEP, except for the following:

- Loopback and Linktrace replies—These are transmitted using the CoS value received in the corresponding loopback or linktrace message.
- AIS messages—If a different CoS value is specified in the AIS configuration.
- Ethernet SLA probe messages.



Note

For Ethernet interfaces, the CoS is carried as a field in the VLAN tag. Therefore, CoS only applies to interfaces where packets are sent with VLAN tags. If the **cos (CFM)** command is specified for a MEP on an interface that does not have a VLAN encapsulation configured, an error message will be logged and no CFM packets will be sent.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the class of service (CoS) for a maintenance end point (MEP) on an interface.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ethernet cfm mep domain Dm1 service Sv1 mep-id 1
RP/0/RP0/CPU0:router(config-if-cfm-mep)# cos 7
```

Related Commands

Command	Description
ethernet cfm (interface) , on page 463	Enters interface CFM configuration mode.

debug ethernet cfm packets

To log debug messages about CFM packets that are sent or received by the Ethernet connectivity fault management (CFM) process, use the **debug ethernet cfm packets** command in EXEC mode.

debug ethernet cfm packets [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]] [**packet-type** {**ccm**|**linktrace**|**loopback**}] [**remote mac-address** *mac-address*] [**remote mep-id** *mep-id*] [**sent**|**received**] [**brief**|**full**|**hexdump**]**debug ethernet cfm packets** [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]] [**packet-type** {**ais**|**ccm**|**delay-measurement**|**linktrace**|**loopback**}] [**remote mac-address** *mac-address*] [**remote mep-id** *mep-id*] [**sent**|**received**] [**brief**|**full**|**hexdump**]

Syntax Description

domain <i>domain-name</i>	(Optional) Filters packets for display by the specified CFM maintenance domain, where <i>domain-name</i> is a string of up to 80 characters.
service <i>service-name</i>	(Optional) Filters packets for display by the specified service name, where <i>service-name</i> is a string of up to 80 characters.
mep-id <i>mep-id</i>	(Optional) Filters packets for display by the specified maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface <i>type interface-path-id</i>	(Optional) Filters packets for display by the specified physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
<i>packet-type</i>	(Optional) Filters packets for display by the specified packet type. The following packet types are valid: • ais • ccm • delay-measurement • linktrace • loopback
remote mac-address <i>mac-address</i>	(Optional) Filters packets for display by the specified MAC address.
remote mep-id <i>mep-id</i>	(Optional) Filters packets for display by the remote MEP properties.
sent	(Optional) Displays only sent packets.
received	(Optional) Displays only received packets.

brief	(Optional) Displays brief information about each packet.
full	(Optional) Displays a full decode of each packet.
hexdump	(Optional) Displays a full decode and hexadecimal output of each packet.

Command Default If no parameters are specified, all CFM packets are debugged and logged.

Command Modes EXEC (#)

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Caution

Enabling packet debugging without filters can have an adverse effect on the performance of the router. To avoid this, filters should always be specified to restrict the output to the domain, service, local MEP, interface, direction and packet type of interest.

Packets can be filtered for debugging by specifying any of the optional parameters.

Task ID	Operations
ethernet-services	read

Examples The following example shows a sample output of the **debug ethernet cfm packets** command with a full decode and hexadecimal output for sent and received CCM packets:

```
RP/0/RP0/CPU0:router# debug ethernet cfm packets hexdump
```

```
RP/0/RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX: GigabitEthernet0/1/0/0 ingress: CCM
packet rcvd at level 2 for domain foo, service foo: length 91, src MAC 0001.0203.0402, dst
MAC 0180.c200.0032: Packet processed successfully
RP/0/RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX: CCM: Level 2, opcode CCM, version
0, RDI bit unset, interval 10s, seq. num 1, remote MEP ID 16, flags 0x05, first TLV offset
70, 0 unknown TLVs
RP/0/RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX: CCM: MAID: MDID String 'dom4',
SMAN String 'ser4'
RP/0/RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX: CCM: Sender ID: Chassis ID Local
'hpr', Mgmt Addr <none>
```

debug ethernet cfm packets

```

RP/0/RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Port status: Up, interface
status Up
RP/0/RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:   Raw Frame:
RP/0/RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:   0x40010546 00000001 00100404
646F6D34 02047365 72340000 00000000 00000000
RP/0/RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:   0x00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000
RP/0/RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:   0x00000000 00000000 00000200
01020400 01010100 05030768 707200
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: GigabitEthernet0/1/0/0 egress: CCM
packet sent at level 2 for domain foo, service foo: length 91, src MAC 0001.0203.0400, dst
MAC 0180.c200.0032
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Level 2, opcode CCM, version
0, RDI bit set, interval 10s, seq. num 16, remote MEP ID 1, flags 0x85, first TLV offset
70, 0 unknown TLVs
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: MAID: MDID String 'foo', SMAN
String 'foo'
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Sender ID: Chassis ID Local
'ios', Mgmt Addr <none>
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Port status: Up, interface
status Up
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   Raw Frame:
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   0x40018546 00000010 00010403
666F6F02 03666F6F 00000000 00000000 00000000
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   0x00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000
RP/0/RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   0x00000000 00000000 00000200
01020400 01010100 05030769 6F7300

```

Related Commands

Command	Description
debug ethernet cfm protocol-state , on page 455	Logs debug messages about CFM state machines and protocol events.

debug ethernet cfm protocol-state

To log debug messages about CFM state machines and protocol events, use the **debug ethernet cfm protocol-state** command in EXEC mode.

debug ethernet cfm protocol-state [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]]

Syntax Description

domain <i>domain-name</i>	(Optional) Filters information for display by the specified CFM maintenance domain, where <i>domain-name</i> is a string of up to 80 characters.
service <i>service-name</i>	(Optional) Filters information for display by the specified service name, where <i>service-name</i> is a string of up to 80 characters.
mep-id <i>mep-id</i>	(Optional) Filters information for display by the specified maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface <i>type interface-path-id</i>	(Optional) Filters information for display by the specified physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

If no parameters are specified, all CFM state machines and protocol events are debugged and logged.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Debug messages can be filtered by specifying any of the optional parameters.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows a sample output of the **debug ethernet cfm protocol-state** command.

```
RP/0/RP0/CPU0:router# debug ethernet cfm protocol-state
```

```
RP/0/RP0/CPU0:May 29 14:41:49.966 : cfmd[150]: CFM: Created 1 local MEPs in PM and Engine
RP/0/RP0/CPU0:May 29 14:41:49.967 : cfmd[150]: CFM: State changes notification for 1 EFPs
RP/0/RP0/CPU0:May 29 14:42:14.143 : cfmd[150]: CFM: New remote MEP detected in domain foo,
  service foo for local MEP ID 1 on interface GigabitEthernet0/1/0/0; remote MEP ID 16, MAC
  0001.0203.0402, errors: set: mismatched MAID; current: mismatched MAID;
RP/0/RP0/CPU0:May 29 14:42:16.644 : cfmd[150]: CFM: Fault alarm notification for local MEP
  - domain: foo, service: foo, MEP ID: 1, interface: GigabitEthernet0/1/0/0, defect:
  cross-connect CCM
RP/0/RP0/CPU0:May 29 14:43:32.247 : cfmd[150]: CFM: Initiated exploratory linktrace to
  ffff.ffff.ffff from MEP in domain foo, service foo, MEP ID 1, interface GigabitEthernet0/1/0/0
  with ttl 64 and transaction ID 65537, reply-filtering Default and directed MAC None
May 29 14:43:49.155 : cfmd[150]: CFM: Remote MEP timed out in domain foo, service foo for
  local MEP ID 1 on interface GigabitEthernet0/1/0/0; remote MEP ID 16, MAC 0001.0203.0402,
  errors: cleared: mismatched MAID; current: none
```

Related Commands

Command	Description
debug ethernet cfm packets, on page 452	Logs debug messages about CFM packets that are sent or received by the Ethernet CFM process.

domain

To create and name a container for all domain configurations and enter the CFM domain configuration mode, use the **domain** command in CFM configuration mode. To remove the domain, use the no form of this command.

domain *domain-name* **level** *level-value* [**id** **null** [**dns** *dns-name*][**mac** *H.H.H*][**string** *string*]]

no domain *domain-name* **level** *level-value* [**id** **null** [**dns** *dns-name*][**mac** *H.H.H*][**string** *string*]]

Syntax Description

<i>domain-name</i>	Administrative name unique to this container, case sensitive ASCII string, up to 80 characters.
level <i>level-value</i>	The CFM protocol level of this domain. Range is 0 to 7.
id	(Optional) Maintenance domain identifier (MDID) used in conjunction with one of the following keywords to specify the MDID type and value: • null • dns <i>DNS-name</i> • mac <i>H.H.H</i> • string <i>string</i>
null	(Optional) Null value ID, used with the id keyword.
dns <i>DNS-name</i>	(Optional) DNS name, up to 43 characters in length, used with the id keyword.
mac <i>H.H.H</i>	(Optional) Hexadecimal MAC address, used with the id keyword.
string <i>string</i>	(Optional) Maintenance domain identifier (MDID) value, up to 43 characters in length, used with the id keyword. Note The domain name may be the used here as the maintenance domain identifier (MDID) if desired.

Command Default

If **id** is not specified, the domain name is used as the MDID.

Command Modes

CFM configuration (config-cfm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The level must be specified.

The maintenance domain identifier (MDID) is used as the first part of the maintenance association identifier (MAID) in CFM frames. If the MDID is not specified, the domain name is used as the MDID by default.

Multiple domains may be specified at the same level. If the MDID is specified as NULL, the MAID is constructed as a short maintenance association name.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create a domain and give it a domain name, level, and maintenance domain identifier (MDID):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)#
```

Related Commands

Command	Description
ethernet cfm (global), on page 461	Enters CFM configuration mode.
ethernet cfm (interface), on page 463	Enters interface CFM configuration mode.
mep domain, on page 511	Creates a MEP on an interface.
service, on page 539	
show ethernet cfm configuration-errors, on page 546	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points, on page 553	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 556	Displays information about local MEPs.

efd

To enable Ethernet Fault Detection (EFD) on all down Maintenance End Points (MEPs) in a down MEPs service, use the **efd** command in CFM domain service configuration mode. To disable EFD, use the no form of this command.

efd

no efd

Syntax Description This command has no keywords or arguments.

Command Default EFD is disabled.

Command Modes CFM domain service configuration (config-cfm-dmn-svc)

Command History	Release	Modification
	Release 3.9.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

EFD can only be enabled for down MEPs within a down MEPs service.

If the **efd** command is issued when any MEP in the service has any of the following error conditions, the MEP will shut down the interface:

- The MEP appears cross-connected to another MAID.
- The MEP is receiving invalid CCMs, such as receiving its own MAC or MEP-ID.
- All peer MEPs are reporting a state other than UP via the Port Status TLV.
- A peer MEP is reporting a state other than UP in Interface Status TLV.
- When cross-check is configured, and a session with an expected MEP times out, EFD is triggered on the local MEP.
- No CCMs are received from a peer MEP appearing in the configured cross-check list.
- An RDI is being received from a peer MEP.
- The MEP is receiving an AIS/LCK.

The MEP will bring the interface back up when the error condition is no longer detected.

**Note**

When an interface is shut down by a MEP using EFD, the MEP will continue to send and receive CCMs and other CFM messages.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable EFD:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# efd
```

Related Commands

Command	Description
log efd, on page 504	Enables logging of EFD state changes to an interface (such as when an interface is shut down or brought up via EFD).
show efd interface, on page 542	Displays all interfaces that are shut down because of EFD.
show ethernet cfm local meps, on page 556	Displays information about local MEPs.

ethernet cfm (global)

To enter Connectivity Fault Management (CFM) configuration mode, use the **ethernet cfm (global)** command in global configuration mode.

ethernet cfm

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Global configuration (config)

Command History	Release	Modification
	Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples The following example shows how to enter the CFM configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)#
```

Related Commands	Command	Description
	domain , on page 457	
	ethernet cfm (interface) , on page 463	Enters interface CFM configuration mode.

Command	Description
show ethernet cfm configuration-errors, on page 546	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points, on page 553	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 556	Displays information about local MEPs.

ethernet cfm (interface)

To enter interface CFM configuration mode, use the **ethernet cfm (interface)** command in interface configuration mode.

ethernet cfm

Syntax Description This command has no keywords or arguments.

Command Default No MEPs are configured on the interface.

Command Modes
Interface configuration (config-if)
Subinterface configuration (config-subif)

Command History	Release	Modification
	Release 3.9.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples The following example shows how to enter interface CFM configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0/CPU0:router(config-if-cfm)#
```

Related Commands	Command	Description
	cos (CFM) , on page 450	Configures the CoS for all CFM packets generated by the MEP on an interface.
	ethernet cfm (global) , on page 461	Enters CFM configuration mode.

Command	Description
mep domain, on page 511	Creates a MEP on an interface.
show ethernet cfm configuration-errors, on page 546	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points, on page 553	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 556	Displays information about local MEPs.

ethernet oam

To enable Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode, use the **ethernet oam** command in interface configuration mode. To disable Ethernet Link OAM, use the **no** form of this command.

ethernet oam

no ethernet oam

Syntax Description This command has no keywords or arguments.

Command Default When enabled on an interface, the Ethernet Link OAM default values apply.

Command Modes Interface configuration (config-if)

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you enable Ethernet Link OAM on an interface, the default Ethernet Link OAM values are applied to the interface. For the default Ethernet Link OAM values, see the related Ethernet Link OAM commands.

Task ID	Operations
ethernet-services	read, write

Examples The following example shows how to enable Ethernet Link OAM and enter interface Ethernet OAM configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)#
```

ethernet oam loopback

To start or stop a loopback at the remote end of an Ethernet OAM interface, use the **ethernet oam loopback** command in EXEC mode.

ethernet oam loopback {**enable**|**disable**} *type interface-path-id*

Syntax Description

enable	Starts a loopback at the remote end.
disable	Stops the loopback at the remote end.
<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

Loopback is not enabled.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command puts the remote peer device into loopback mode. This means that all traffic sent to the peer is looped back, which means that it is sent back from the peer and received by the router. All traffic received from the peer device is discarded.

This command returns when the OAM client receives confirmation from the remote end that the remote loopback has been enabled or disabled. If no response or a failure response is received, an error is returned.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to start a loopback at the far end of an Ethernet OAM interface.

```
RP/0/RP0/CPU0:router# ethernet oam loopback enable tengigabitethernet 0/6/1/0
```

Related Commands

Command	Description
remote-loopback	Enables a remote loopback on the far end of an Ethernet OAM interface.
action remote-loopback, on page 405	Configures what action is taken on an interface when a remote-loopback event occurs.
snmp-server traps ethernet oam events, on page 601	
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.

ethernet oam profile

To create an Ethernet Operations, Administration and Maintenance (EOAM) profile and enter EOAM configuration mode, use the **ethernet oam profile** command in global configuration mode. To delete an EOAM profile, use the **no** form of this command.

ethernet oam profile *profile-name*

no ethernet oam profile *profile-name*

Syntax Description

<i>profile-name</i>	Text string name of the OAM profile. The maximum length is 32 bytes.

Command Default

No default behavior or values

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Before you can delete an EOAM profile, you must remove the profile from all interfaces to which it is attached.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create an Ethernet OAM profile and enter Ethernet OAM configuration mode:

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1  
RP/0/RP0/CPU0:router(config-eoam)#
```


ethernet sla

To enter the Ethernet Service Level Agreement (SLA) configuration mode, use the **ethernet sla** command in global configuration mode.

ethernet sla

Syntax Description	This command has no keywords or arguments.

Command Default	No default behavior or values

Command Modes	Global configuration (config)

Command History	Release	Modification
	Release 4.0.0	This command was introduced.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples	The following example shows how to enter the Ethernet SLA configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)#
```

ethernet sla on-demand operation type cfm-delay-measurement probe

To execute an on-demand Ethernet SLA operation probe for CFM delay measurement, use the **ethernet sla on-demand operation type cfm-delay-measurement probe** command in EXEC mode.

ethernet sla on-demand operation type {cfm-delay-measurement} probe [*priority number*] [*send {packet {once| every number {milliseconds| seconds| minutes| hours}}| burst {once| every number {seconds| minutes| hours}}}*] *packet count number interval number {milliseconds| seconds}* *packet size bytes [test pattern {hex 0x HHHHHHHH| pseudo-random}] domain domain_name source interface type interface-path-id target {mac-address H.H.H.H| mep-id id_number} statistics measure {one-way-delay-ds| one-way-delay-sd| one-way-jitter-ds| one-way-jitter-sd| round-trip-delay| round-trip-jitter} [aggregate {none| bins number width milliseconds}] [buckets {archive number size number {per-probe| probes}}] [schedule {now| at hh:mm [.ss] [day [month [year]]]] in number {seconds| minutes| hours}} [for duration {seconds| minutes| hours}] [repeat every number {seconds| minutes| hours} count probes]] [asynchronous]*

Syntax Description

priority number	(Optional) Configures the priority of outgoing SLA probe packets. The range is 0 to 7. The default is to use the COS bits for the egress interface.
send packet once	(Optional) Sends one packet one time.
send packet every number {milliseconds seconds minutes hours}	(Optional) Sends one packet every specified number of milliseconds, seconds, minutes, or hours, where <i>number</i> is in the following range: • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 168 hours • 100 to 10000 milliseconds (specified in increments of 100)
send burst once	(Optional) Specifies that a burst of packets is sent one time. This is the default.

send burst every <i>number</i> { seconds minutes hours }}	(Optional) Sends a burst of packets every specified number of seconds, minutes, or hours, where <i>number</i> is in the following range: • 1–3600 seconds • 1–1440 minutes • 1–168 hours The default is to send a burst every 10 seconds.
packet count <i>number</i>	Specifies the number of packets to be sent in a burst, in the range 2 to 600. The default is 10.
interval <i>number</i> { milliseconds seconds }	Specifies the time between sending packets in a burst, where <i>number</i> is in the following range: • 100 to 30000 milliseconds • 1 to 30 seconds Note The total length of a burst (the packet count multiplied by the interval) must not exceed 1 minute.
packet size <i>bytes</i>	Minimum size of the packet including padding when necessary. The range is 1 to 9000 bytes. This value is the total frame size including the Layer 2 or Layer 3 packet header.
test pattern hex 0x <i>HHHHHHHH</i>	(Optional) Specifies a 4-byte string (8 hexadecimal characters) to repeat as many times as required to fill the outgoing probe packet to the specified minimum packet size. The default is all 0s.
test pattern pseudo-random	(Optional) Specifies a pseudo-random bit sequence determined by the protocol to fill the outgoing probe packet to the specified minimum packet size.
domain <i>domain-name</i>	Specifies the name of the domain for the locally defined CFM MEP.

source interface <i>type</i>	Specifies the source interface type of the locally defined CFM MEP. For more information, use the question mark (?) online help function.
interface-path-id <i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
target mac-address <i>H.H.H</i>	Specifies the MAC address (in dotted hexadecimal format) of the target MEP that is known to the local MEP for the probe.
target mep-id <i>id-number</i>	Specifies the ID (from 1 to 8191) of the target MEP that is known to the local MEP for the probe.
statistics measure	(Optional) Specifies the type of statistics to collect: • one-way-delay-ds—One-way delay statistics from destination to source. • one-way-delay-sd—One-way delay statistics from source to destination. • one-way-jitter-ds—One-way delay jitter from destination to source. • one-way-jitter-sd—One-way delay jitter from source to destination. • round-trip-delay—Round-trip delay statistics. • round-trip-jitter—Round-trip jitter statistics. All statistics are collected by default.

aggregate none	(Optional) Specifies that statistics are not aggregated into bins, and each statistic is stored individually. Caution This option can be memory-intensive and should be used with care.
aggregate bins <i>number</i>	(Optional) Specifies the number of bins (from 2 to 100) within each bucket to store sample packets from the probe. The default is to aggregate into one bin.
width <i>milliseconds</i>	Specifies the range of the samples to be collected within each bin in milliseconds, from 1 to 10000. Based on the specified width, bins are established in the following way: • Delay measurements (round-trip or one-way)—The lower bound of the bins is zero and the first bin's upper limit is 0 plus the specified width, and the last bin is unbounded. • Jitter measurements (round-trip or one-way)—The bins are evenly distributed around zero, with both the lowest and highest numbered bins being unbounded. See the Usage Guidelines for more information.
buckets archive <i>number</i>	(Optional) Specifies the number of buckets to store in memory from 1 to 100. The default is 100.
buckets size <i>number</i>	(Optional) Specifies the number of buckets to be used for probes from 1 to 100. The default is 1.
per-probe	Specifies that probes span multiple buckets.
probes	Specifies that buckets span multiple probes.

schedule now	(Optional) Specifies that the probe begins as soon as you enter the command. This is the default.
schedule at <i>hh:mm</i>	(Optional) Specifies a specific time at which to start the probe in 24-hour notation.
<i>ss</i>	(Optional) Number of seconds into the next minute at which to start the probe.
day	(Optional) Number in the range 1 to 31 of the day of the month on which to start the probe.
month	(Optional) Name of the month (full word in English) in which to start the probe.
year	(Optional) Year (fully specified as 4 digits) in which to start the probe.
schedule in <i>number</i> {seconds minutes hours}	(Optional) Specifies a relative time, as a number of seconds, minutes or hours from the current time, at which to start the probe, where <i>number</i> is in the following ranges: • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours
for <i>duration</i> {seconds minutes hours}	(Optional) Specifies the length of the probe as a number of seconds, minutes, or hours, where <i>number</i> is in the following ranges: • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours Note The duration should not exceed the interval specified by the repeat every option.

repeat every <i>number</i> { seconds minutes hours }	(Optional) Specifies the interval at which to restart the probe as a number of seconds, minutes, or hours, where <i>number</i> is in the following ranges: • 1 to 90 seconds • 1 to 90 minutes • 1 to 24 hours The default is that probes are not repeated, and there is no default interval.
count <i>probes</i>	Specifies the number of probes to run in the range 1–100. There is no default.
asynchronous	(Optional) Specifies that the command displays the on-demand operation ID and exits immediately, with the operation continuing in the background. The default is synchronous and the operation displays the on-demand operation ID and all results on the console when it completes.

Command Default No on-demand operations are configured or executed.

Command Modes EXEC (#)

Command History	Release	Modification
	Release 4.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

This example shows how to enter the most basic SLA on-demand operation to measure CFM delay statistics. This example implements these defaults:

- Send a burst once for a packet count of 10 and interval of 1 second (10-second probe).
- Use default class of service (CoS) for the egress interface.
- Measure all statistics, including both one-way and round-trip delay and jitter statistics.
- Aggregate statistics into one bin.
- Schedule now.
- Display results on the console.

```
RP/0/RP0/CPU0:router# ethernet sla on-demand operation type cfm-delay-measurement
probe domain D1 source interface TenGigE 0/6/1/0 target mep-id 100
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 436	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 438	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 589	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 592	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

ethernet sla on-demand operation type cfm-loopback probe

To execute an on-demand Ethernet SLA operation probe for CFM loopback measurement, use the **ethernet sla on-demand operation type cfm-loopback probe** command in EXEC configuration mode.

ethernet sla on-demand operation type cfm-delay-measurement probe [*priority number*]**send** {*packet* {*once*| *every number* {*milliseconds*| *seconds*| *minutes*| *hours*}}| *burst* {*once*| *every number* {*seconds*| *minutes*| *hours*}}| *packet count number interval number* {*milliseconds*| *seconds*}}| *packet size bytes* [*test pattern* {*hex 0x HHHHHHHH*| *pseudo-random*}]| *domain domain_name* **source interface type interface-path-id target** {*mac-address H.H.H.H*| *mep-id id_number*}| **statistics measure** {*one-way-delay-ds*| *one-way-delay-sd*| *one-way-jitter-ds*| *one-way-jitter-sd*| *round-trip-delay*| *round-trip-jitter*}| **aggregate** {*none*| *bins number width milliseconds*}| **buckets** {*archive number*| *size number* {*per-probe*| *probes*}}| **schedule** {*now*| *at hh:mm:ss* [*day month year*]}| **in** *number* {*seconds*| *minutes*| *hours*}}| **for duration** {*seconds*| *minutes*| *hours*}| **repeat every number** {*seconds*| *minutes*| *hours*}| **count probes**[*asynchronous*]

Syntax Description

priority number	(Optional) Configures the priority of outgoing SLA probe packets. The range is 0 to 7. The default is to use the COS bits for the egress interface.
send packet once	(Optional) Sends one packet one time.
send packet every number { <i>milliseconds</i> <i>seconds</i> <i>minutes</i> <i>hours</i> }	(Optional) Sends one packet every specified number of milliseconds, seconds, minutes, or hours, where <i>number</i> is in the following range: • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 168 hours • 100 to 10000 milliseconds (specified in increments of 100)
send burst once	(Optional) Specifies that a burst of packets is sent one time. This is the default.

send burst every <i>number</i> { seconds minutes hours }}	(Optional) Sends a burst of packets every specified number of seconds, minutes, or hours, where <i>number</i> is in the following range: • 1–3600 seconds • 1–1440 minutes • 1–168 hours The default is to send a burst every 10 seconds.
packet count <i>number</i>	Specifies the number of packets to be sent in a burst, in the range 2 to 600. The default is 10.
interval <i>number</i> { milliseconds seconds }	Specifies the time between sending packets in a burst, where <i>number</i> is in the following range: • 100 to 30000 milliseconds • 1 to 30 seconds Note The total length of a burst (the packet count multiplied by the interval) must not exceed 1 minute.
packet size <i>bytes</i>	Minimum size of the packet including padding when necessary. The range is 1 to 9000 bytes. This value is the total frame size including the Layer 2 or Layer 3 packet header.
test pattern hex 0x <i>HHHHHHHH</i>	(Optional) Specifies a 4-byte string (8 hexadecimal characters) to repeat as many times as required to fill the outgoing probe packet to the specified minimum packet size. The default is all 0s.
test pattern pseudo-random	(Optional) Specifies a pseudo-random bit sequence determined by the protocol to fill the outgoing probe packet to the specified minimum packet size.
domain <i>domain-name</i>	Specifies the name of the domain for the locally defined CFM MEP.

source interface <i>type</i>	Specifies the source interface type of the locally defined CFM MEP. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
target mac-address <i>H.H.H.H</i>	Specifies the MAC address (in dotted hexadecimal format) of the target MEP that is known to the local MEP for the probe.
target mep-id <i>id-number</i>	Specifies the ID (from 1 to 8191) of the target MEP that is known to the local MEP for the probe.
statistics measure	(Optional) Specifies the type of statistics to collect: • one-way-delay-ds—One-way delay statistics from destination to source. • one-way-delay-sd—One-way delay statistics from source to destination. • one-way-jitter-ds—One-way jitter statistics from destination to source. • one-way-jitter-sd—One-way jitter statistics from source to destination. • round-trip-delay—Round-trip delay statistics. • round-trip-jitter—Round-trip jitter statistics. All statistics are collected by default.

aggregate none	(Optional) Specifies that statistics are not aggregated into bins, and each statistic is stored individually. Caution This option can be memory-intensive and should be used with care.
aggregate bins <i>number</i>	(Optional) Specifies the number of bins (from 2 to 100) within each bucket to store sample packets from the probe. The default is to aggregate into one bin.
width <i>milliseconds</i>	Specifies the range of the samples to be collected within each bin in milliseconds, from 1 to 10000. Based on the specified width, bins are established in the following way: • Delay measurements (round-trip or one-way)—The lower bound of the bins is zero and the first bin's upper limit is 0 plus the specified width, and the last bin is unbounded. • Jitter measurements (round-trip or one-way)—The bins are evenly distributed around zero, with both the lowest and highest numbered bins being unbounded. See the Usage Guidelines for more information.
buckets archive <i>number</i>	(Optional) Specifies the number of buckets to store in memory from 1 to 100. The default is 100.
buckets size <i>number</i>	(Optional) Specifies the number of buckets to be used for probes from 1 to 100. The default is 1.
per-probe	Specifies that probes span multiple buckets.
probes	Specifies that buckets span multiple probes.

schedule now	(Optional) Specifies that the probe begins as soon as you enter the command. This is the default.
schedule at <i>hh:mm:ss</i>	(Optional) Specifies a specific time at which to start the probe in 24-hour notation.
<i>day</i>	(Optional) Number in the range 1 to 31 of the day of the month on which to start the probe.
<i>month</i>	(Optional) Name of the month (full word in English) in which to start the probe.
<i>year</i>	(Optional) Year (fully specified as 4 digits) in which to start the probe.
schedule in <i>number</i> {seconds minutes hours}	(Optional) Specifies a relative time, as a number of seconds, minutes or hours from the current time, at which to start the probe, where <i>number</i> is in the following ranges: • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours
for <i>duration</i> {seconds minutes hours}	(Optional) Specifies the length of the probe as a number of seconds, minutes, or hours, where <i>number</i> is in the following ranges: • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours Note The duration should not exceed the interval specified by the repeat every option.

repeat every <i>number</i> { seconds minutes hours }	(Optional) Specifies the interval at which to restart the probe as a number of seconds, minutes, or hours, where <i>number</i> is in the following ranges: • 1 to 90 seconds • 1 to 90 minutes • 1 to 24 hours The default is that probes are not repeated, and there is no default interval.
count <i>probes</i>	Specifies the number of probes to run in the range 1–100. There is no default.
asynchronous	(Optional) Specifies that the command displays the on-demand operation ID and exits immediately, with the operation continuing in the background. The default is synchronous and the operation displays the on-demand operation ID and all results on the console when it completes.

Command Default No on-demand operations are configured or executed.

Command Modes EXEC (#)

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to enter the most basic SLA on-demand operation to measure CFM loopback statistics. This example implements the following defaults:

- Send a burst once for a packet count of 10 and interval of 1 second (10-second probe).
- Use default test pattern of 0's for padding.
- Use default class of service (CoS) for the egress interface.
- Measure all statistics.
- Aggregate statistics into one bin.
- Schedule now.
- Display results on the console.

```
RP/0/RP0/CPU0:router# ethernet sla on-demand operation type cfm-loopback
probe packet size 1500 domain D1 source interface TenGigE 0/6/1/0 target mep-id 100
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 436	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 438	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 589	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 592	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

frame-period threshold

To configure the thresholds that trigger an Ethernet OAM frame-period error event, use the **frame-period threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame-period threshold low *threshold* [**high** *threshold*]

no frame-period threshold low *threshold* [**high** *threshold*]

Syntax Description

low <i>threshold</i>	Low threshold, in frames, that triggers a frame-period error event. The range is 0 to 1000000.
high <i>threshold</i>	(Optional) High threshold, in frames, that triggers a frame-period error event. The range is 0 to 1000000. The high threshold value can be configured only in conjunction with the low threshold value.

Command Default

The default low threshold is 1.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)
Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When the low threshold is passed, a frame-period error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame-period error event.

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)# frame-period threshold low 100 high 600000
```

frame-period window

To configure the window size for an Ethernet OAM frame-period error event, use the **frame-period window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame-period window *window*

no frame-period window *window*

Syntax Description

<i>window</i>	Size of the window for a frame-period error in milliseconds. The range is 100 to 60000.

Command Default

The default value is 1000.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)
Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the window size for a frame-period error.

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)# frame-period window 60000
```

frame-seconds threshold

To configure the thresholds that trigger a frame-seconds error event, use the **frame-seconds threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame-seconds threshold low threshold [**high threshold**]

no frame-seconds threshold low threshold [**high threshold**]

Syntax Description

low threshold	Low threshold, in seconds, that triggers a frame-seconds error event. The range is 0 to 900.
high threshold	(Optional) High threshold, in seconds, that triggers a frame-seconds error event. The range is 1 to 900. The high threshold value can be configured only in conjunction with the low threshold value.

Command Default

The default value is 1.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When the low threshold is passed, a frame-seconds error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame-seconds error event:

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1  
RP/0/RP0/CPU0:router(config-eoam)# link-monitor (config-eoam)# link-monitor  
RP/0/RP0/CPU0:router(config-eoam-lm)# frame-seconds threshold low 10 high 900
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 495	Enters Ethernet OAM link monitor configuration mode.

frame-seconds window

To configure the window size for the OAM frame-seconds error event, use the **frame-seconds window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame-seconds window *window*

no frame-seconds window *window*

Syntax Description

<i>window</i>	Size of the window for a frame-seconds error in milliseconds. The range is 10000 to 900000.

Command Default

The default value is 60000.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the window size for a frame-seconds error.

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)# frame-seconds window 900000
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 495	Enters Ethernet OAM link monitor configuration mode.

frame threshold

To configure the thresholds that triggers an Ethernet OAM frame error event, use the **frame threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame threshold low threshold [**high threshold**]

no frame threshold low threshold [**high threshold**]

Syntax Description

low threshold	Low threshold, in symbols, that triggers a frame error event. The range is 0 to 12000000.
high threshold	(Optional) High threshold, in symbols, that triggers a frame error event. The range is 0 range is 0 to 12000000. The high threshold value can be configured only in conjunction with the low threshold value.

Command Default

The default low threshold is 1.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When the low threshold is passed, a frame error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame error event:

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1  
RP/0/RP0/CPU0:router(config-eoam)# link-monitor  
RP/0/RP0/CPU0:router(config-eoam-lm)# frame threshold low 100 high 60000
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 495	Enters Ethernet OAM link monitor configuration mode.

frame window

To configure the frame window size of an OAM frame error event, use the **frame window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame window *window*

no frame window *window*

Syntax Description

<i>window</i>	Size of the window for a frame error in seconds. The range is 1000 to 60000.

Command Default

The default value is 1000.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the window size for a frame error.

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)# frame window 60
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 495	Enters Ethernet OAM link monitor configuration mode.

link-monitor

To enter Ethernet OAM link monitor configuration mode, use the **link-monitor** command in Ethernet OAM configuration mode. To enter interface Ethernet OAM link monitor configuration mode, use the **link-monitor** command in interface Ethernet OAM configuration mode.

link-monitor

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enter the Ethernet OAM link monitor configuration mode from global configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)#
```

The following example shows how to enter the link monitor configuration mode from interface Ethernet OAM configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0/CPU0:router(config-if)# ethernet oam
```

```
RP/0/RP0/CPU0:router(config-if-eoam)# link-monitor
```

log ais

To configure AIS logging for a Connectivity Fault Management (CFM) domain service to indicate when AIS or LCK packets are received, use the **log ais** command in CFM domain service configuration mode. To disable AIS logging, use the no form of this command.

log ais

no log ais

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure AIS logging for a Connectivity Fault Management (CFM) domain service to indicate when AIS or LCK packets are received:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# log ais
```

Related Commands

Command	Description
ais transmission, on page 417	Configures AIS transmission for a CFM domain service.

Command	Description
ais transmission up, on page 419	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais, on page 548	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 556	Displays information about local MEPs.

log continuity-check errors

To enable logging of continuity-check errors, use the **log continuity-check errors** command in CFM domain service configuration mode. To disable logging of continuity-check errors, use the no form of this command.

log continuity-check errors

no log continuity-check errors

Syntax Description This command has no keywords or arguments.

Command Default Logging is disabled.

Command Modes CFM domain service configuration (config-cfm-dmn-svc)

Command History	Release	Modification
	Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The following types of continuity-check errors are logged:

- Incorrect level (cross-connect)
- Incorrect interval
- Incorrect MA-ID (cross-connect)
- Local MAC address received (loop)
- Local MEP-ID received (mis-config)
- Invalid source MAC received
- RDI received

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check errors
```


log continuity-check mep changes

To enable logging of peer maintenance-end-point (MEP) state changes, use the **log continuity-check mep changes** command in CFM domain service configuration mode. To disable logging of peer MEP state changes, use the no form of this command.

log continuity-check mep changes

no log continuity-check mep changes

Syntax Description This command has no keywords or arguments.

Command Default Logging is disabled

Command Modes CFM domain service configuration (config-cfm-dmn-svc)

Command History	Release	Modification
	Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command enables logging of state changes that occur in MEPs for a particular service, such as:

- New peer MEP detected.
- Peer MEP time out (loss of continuity) detected.

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check mep changes
```

log crosscheck errors

To enable logging of crosscheck error events, use the **log crosscheck errors** command in CFM domain service configuration mode. To disable logging of crosscheck error events, use the no form of this command.

log crosscheck errors

no log crosscheck errors

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command enables logging of crosscheck errors, such as:

- MEPs missing
- Additional peer MEPs detected



Note

Crosscheck errors are only detected and logged when crosscheck is configured using the **mep crosscheck** and **mep-id** commands.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
```

```
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# log crosscheck errors
```

Related Commands

Command	Description
mep crosscheck, on page 508	Enters CFM MEP crosscheck configuration mode.
mep-id, on page 509	Enables crosscheck on a MEP.

log efd

To enable logging of Ethernet Fault Detection (EFD) state changes to an interface (such as when an interface is shut down or brought up via EFD), use the **log efd** command in CFM domain service configuration mode. To disable EFD logging, use the no form of this command.

log efd

no log efd

Syntax Description This command has no keywords or arguments.

Command Default EFD logging is disabled.

Command Modes CFM domain service configuration (config-cfm-dmn-svc)

Command History	Release	Modification
	Release 3.9.1	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When EFD logging is enabled, a syslog is generated whenever the EFD state of an interface changes.

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples The following example shows how to enable EFD logging:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# log efd
```

Related Commands

Command	Description
efd, on page 459	Enables EFD on all down MEPs in a down MEPs service.
show efd interface, on page 542	Displays all interfaces that are shut down because of EFD.

maximum-meps

To configure the maximum number of maintenance end points (MEPs) for a service, use the **maximum-meps** command in CFM domain service configuration mode. To return to the default value, use the no form of this command.

maximum-meps *number*

Syntax Description

<i>number</i>	Maximum number of MEPs allowed for this service. The range is 2 to 8190.

Command Default

The default is 100.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command configures the maximum number of peer maintenance end points (MEPs). It does not limit the number of local MEPs. The configured **maximum-meps** *number* must be at least as great as the number of configured crosscheck MEPs.

The **maximum-meps** *number* limits the number of peer MEPs, for which local MEPs store continuity-check messages (CCMs). When the limit is reached, CCMs from any new peer MEPs are ignored, but CCMs from existing peer MEPs continue to be processed normally.

The **maximum-meps** *number* also limits the size of the CCM learning database.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
```

```
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# maximum-meps 4000
```

Related Commands

Command	Description
domain, on page 457	
ethernet cfm (global), on page 461	Enters CFM configuration mode.
ethernet cfm (interface), on page 463	Enters interface CFM configuration mode.
service, on page 539	
show ethernet cfm configuration-errors, on page 546	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points, on page 553	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 556	Displays information about local MEPs.
show ethernet cfm peer meps, on page 562	Displays information about maintenance end points (MEPs) for peer MEPs.

mep crosscheck

To enter CFM MEP crosscheck configuration mode, use the **mep crosscheck** command in CFM domain service configuration mode.

mep crosscheck

Syntax Description

This command has no keywords or arguments.

Command Default

Not configured, in which case no crosscheck is performed on the MEP.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RP0/CPU0:router(config-cfm-xcheck)#
```


mep-id

To enable crosscheck on a maintenance end point (MEP), use the **mep-id** command in CFM MEP crosscheck configuration mode. To disable crosscheck on a MEP, use the **no** form of this command.

mep-id *mep-id-number* [**mac-address** *mac-address*]

no mep-id *mep-id-number* [**mac-address** *mac-address*]

Syntax Description

mac <i>mac-address</i>	(Optional) MAC address of the interface upon which the MEP resides, in standard hexadecimal format, hh:hh:hh:hh:hh:hh.

Command Default

Not configured, in which case no crosscheck is performed on the MEP.

Command Modes

CFM MEP crosscheck configuration (config-cfm-xcheck)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command enables Crosscheck on the maintenance end point (MEP) specified by the MEP ID number (*mep-id-number*). The range for MEP ID numbers is 1 to 8191. Crosscheck is enabled when the first crosscheck MEP is entered.

Repeat this command for every MEP that you want to include in the expected set of MEPs for crosscheck.

Crosscheck detects the following two additional defects for continuity-check messages (CCMs) on peer MEPs:

- Peer MEP missing—A crosscheck MEP is configured, but has no corresponding peer MEP from which to receive CCMs.
- Peer MEP unexpected—A peer MEP is sending CCMs, but no crosscheck MEP is configured for it.



Note

If more than one local MEP is configured for a service, all the local MEPs must be included in the list of configured crosscheck MEPs.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RP0/CPU0:router(config-cfm-xcheck)# mep-id 10
```

mep domain

To create a maintenance end point (MEP) on an interface, use the **mep domain** command in interface CFM configuration mode. To remove the MEP from the interface, use the **no** form of this command.

mep domain *domain-name* **service** *service-name* **mep-id** *id-number*

no mep domain *domain-name* **service** *service-name* **mep-id** *id-number*

Syntax Description

domain <i>domain-name</i>	Domain in which to create the maintenance end point (MEP).
service <i>service-name</i>	Operation service in which to create the maintenance end point (MEP).
mep-id <i>id-number</i>	Maintenance end points (MEP) identifier to assign to this MEP. The range is 1 to 8191.

Command Default

No MEPs are configured on the interface.

Command Modes

Interface CFM configuration (config-if-cfm)

Command History

Release	Modification
Release 3.9.1	This command was introduced. This command replaces the ethernet cfm mep command.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

CFM Maintenance end points (MEPs) are supported on all Ethernet interfaces and VLAN subinterfaces.

This command creates MEPs in the UP MEP state, unless the specified **service** is configured with MEPs in the DOWN MEP state. See the [service](#), on page 539 command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create a MEP using an ID of 1 on the CFM domain named DM1 and service named Sv1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

Related Commands

Command	Description
ethernet cfm (interface) , on page 463	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors , on page 546	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.

mib-retrieval

To enable MIB retrieval in an Ethernet OAM profile or on an Ethernet OAM interface, use the **mib-retrieval** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return the interface to the default (disabled), use the **disable** keyword.

mib-retrieval [disable]

Syntax Description

disable	Disables MIB retrieval the Ethernet OAM interface.

Command Default

MIB retrieval is disabled by default.

Command Modes

Ethernet OAM configuration (config-eoam)
Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When MIB retrieval is enabled on an Ethernet OAM interface, the OAM client advertises support for MIB retrieval to the peer.

When MIB retrieval is disabled (the default), only the enable form of the **mib-retrieval** command is available in interface Ethernet OAM configuration mode. The **disable** keyword is provided to override the profile when needed.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable MIB retrieval on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0/CPU0:router(config-if)# ethernet oam
```

```
RP/0/RP0/CPU0:router(config-if-eoam)# mib-retrieval
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 582	

mip auto-create

To enable the automatic creation of MIPs in a cross-connect, use the **mip auto-create** command in CFM domain service configuration mode. To disable automatic creation of MIPs, use the **no** form of this command.

mip auto-create {all| lower-mep-only}

no mip auto-create {all| lower-mep-only}

Syntax Description

all	Enables automatic creation of MIPs on all interfaces.
lower-mep-only	Enables automatic creation of MIPs only on interfaces with a MEP at a lower level.

Command Default

No default behavior or values

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The MIP auto-creation feature is only configured for services associated with cross-connects.

Unlike MEPs, MIPs are not explicitly configured on each interface. MIPs are created automatically according to the algorithm specified in the CFM 802.1ag standard. The algorithm, in brief, operates as follows for each interface:

- The cross-connect for the interface is found, and all services associated with that cross-connect are considered for MIP auto-creation.
- The level of the highest-level MEP on the interface is found. From among the services considered above, the service in the domain with the lowest level that is higher than the highest MEP level is selected. If there are no MEPs on the interface, the service in the domain with the lowest level is selected.
- The MIP auto-creation configuration for the selected service is examined to determine whether a MIP should be created.

**Note**

Configuring a MIP auto-creation policy for a service does not guarantee that a MIP will automatically be created for that service. The policy is only considered if that service is selected by the algorithm first.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples**Related Commands**

Command	Description
domain , on page 457	
ethernet cfm (global) , on page 461	Enters CFM configuration mode.
service , on page 539	
show ethernet cfm configuration-errors , on page 546	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points , on page 553	Displays a list of local maintenance points.
show ethernet cfm local meps , on page 556	Displays information about local MEPS.
show ethernet cfm peer meps , on page 562	Displays information about maintenance end points (MEPs) for peer MEPS.

mode (Ethernet OAM)

To configure the Ethernet OAM mode on an interface, use the **mode** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of the command.

mode {**active**|**passive**}

Syntax Description

passive	Specifies that the interface operates in passive mode, where it cannot initiate the discovery process, generate a retrieval PDU, or request loopback.
active	(Interface Ethernet OAM configuration only) Specifies that the interface operates in active mode to initiate processes and make requests.

Command Default

The default is active.

Command Modes

Ethernet OAM configuration (config-eoam)
Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If a profile exists on the interface, setting the mode with this command overrides the mode setting in the profile on an interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable Ethernet OAM passive mode on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# profile Profile_1
```

```
RP/0/RP0/CPU0:router(config-if-eoam)# mode passive
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 582	

monitoring

To enable Ethernet OAM link monitoring, use the **monitoring** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return link monitoring to its default state of enabled, use the **no** form of this command.

monitoring [disable]

no monitoring [disable]

Syntax Description

disable	(Optional) Disables Ethernet OAM link monitoring.
Note	When configuring on a profile, only the monitoring disable form of the command is supported.

Command Default

Link monitoring is enabled by default.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Monitoring is enabled by default. To disable it either on a profile or an interface, use the **monitoring disable** form of the command.

If monitoring is disabled on a profile, but you want to override the configuration and enable it for an interface, use the **monitoring** command in interface Ethernet OAM link monitor configuration mode.

You cannot configure the **monitoring** command without the **disable** keyword on a profile.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to disable link-monitoring on an Ethernet OAM interface:

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)# monitoring disable
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
link-monitor, on page 495	Enters Ethernet OAM link monitor configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam statistics, on page 585	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 582	

packet size

To configure the minimum size (in bytes) for outgoing probe packets, including padding when necessary, use the **packet size** command in SLA profile probe configuration mode. To remove this configuration, use the **no** form of this command.

packet size *bytes* [**test pattern** {**hex 0x** *HHHHHHHH*} **pseudo-random**]

no packet size *bytes* [**test pattern** {**hex 0x** *HHHHHHHH*} **pseudo-random**]

Syntax Description

<i>bytes</i>	Minimum size of the packet including padding when necessary. The range is 1 to 9000 bytes. This value is the total frame size including the Layer 2 or Layer 3 packet header.
test pattern hex 0x <i>HHHHHHHH</i>	(Optional) Specifies a 4-byte string (8 hexadecimal characters) to repeat as many times as required to fill the outgoing probe packet to the specified minimum packet size. The default is all 0s.
test pattern pseudo-random	(Optional) Specifies a pseudo-random bit sequence determined by the protocol to fill the outgoing probe packet to the specified minimum packet size.

Command Default

The minimum packet size is not configured. When a minimum packet size is configured and padding is required, the default padding is all 0s.

Command Modes

SLA profile probe configuration (config-sla-prof-pb)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For supported packet types, this configuration determines the minimum size of all outgoing SLA probe packets, including the size to which they are padded. The amount of padding that is added to a packet depends on the type of frame that is sent and the amount of data in the frame.

When the packet size is not configured, packets are sent at the minimum size required to fit all the required information. Even when the packet size is configured, the packets may be larger than the configured size if the required information exceeds the configured value.

**Note**

If a probe packet is too large, it may get dropped somewhere in the network.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the minimum size of outgoing probe packets using default padding of all 0s as needed:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0/CPU0:router(config-sla-prof-pb)# packet size 9000
RP/0/RP0/CPU0:router(config-sla-prof-pb)# commit
```

The following example shows how to configure a hexadecimal test pattern to pad packets with to reach the minimum packet size:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0/CPU0:router(config-sla-prof-pb)# packet size 9000 test pattern hex 0xabcdabcd
RP/0/RP0/CPU0:router(config-sla-prof-pb)# commit
```

priority (SLA)

To configure the priority of outgoing SLA probe packets, use the **priority** command in SLA profile probe configuration mode. To return the priority to the default value, use the no form of this command.

priority *priority*

no priority *priority*

Syntax Description

<i>priority</i>	Priority level. The range is 0 to 7.

Command Default

When the priority is not configured by SLA, the default is the Class of Service (CoS) priority for the egress interface.

Command Modes

SLA profile probe configuration (config-sla-prof-pb)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The default priority for all CFM operation types is the Class of Service (CoS) priority for the egress interface. SLA operations that are configured on Maintenance End Points (MEPs) do not use the Class of Service (CoS) settings that are configured independently on Maintenance End Points (MEPs). Use this command to change the priority level of SLA probe packets.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the priority of outgoing SLA probe packets.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# probe
```

```
RP/0/RP0/CPU0:router(config-sla-prof-pb)# priority 7
```


probe

To enter SLA profile probe configuration mode, use the **probe** command in SLA profile configuration mode. To exit to the previous mode, use the no form of this command.

probe

no probe

Syntax Description This command has no keywords or arguments.

Command Default If no items are configured in the probe mode, all items in the probe mode use their default values.

Command Modes SLA profile configuration (config-sla-prof)

Command History	Release	Modification
	Release 4.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Each profile may optionally have 1 probe submode.

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples The following example shows how to enter the SLA profile probe configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0/CPU0:router(config-sla-prof-pb)#
```

profile (EOAM)

To attach an Ethernet OAM profile to an interface, use the **profile** command in interface Ethernet OAM configuration mode. To remove the profile from the interface, use the no form of this command.

profile *name*

no profile *name*

Syntax Description

<i>name</i>	Text name of the Ethernet OAM profile to attach to the interface.

Command Default

No profile is attached.

Command Modes

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When an Ethernet OAM profile is attached to an interface using this command, all of the parameters configured for the profile are applied to the interface.

Individual parameters that are set by the profile configuration can be overridden by configuring them directly on the interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to attach an Ethernet OAM profile to a Gigabit Ethernet interface.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# profile Profile_1
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 582	

profile (SLA)

To create an SLA operation profile and enter the SLA profile configuration mode, use the **profile** command in SLA configuration mode. To remove the profile, use the **no** form of this command.

profile *profile-name* **type** {{**cfm-delay-measurement**}}| **cfm-loopback**
no profile *profile-name*

Syntax Description

<i>profile-name</i>	Profile name, case-sensitive string up to 31 characters in length. The name “all” cannot be used.
type	Specifies the type of packets sent by operations in this profile. Valid types are: • cfm-delay-measurement: CFM delay measurement packets • cfm-loopback: CFM loopback packets

Command Default

No default behavior or values

Command Modes

Ethernet SLA configuration (config-sla)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

Each profile is uniquely identified by its name. Changing the packet **type** for the profile removes all stored data from the profile and is equivalent to deleting the profile and creating a new profile.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure an SLA operation profile and enter the SLA profile configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)#
```

require-remote

To require that certain features are enabled before an OAM session can become active, or to disable a requirement that is part of an active OAM profile, use the **require-remote** command in Ethernet OAM configuration or interface Ethernet OAM configuration mode. To remove the configuration and return to the default, use the **no** form of this command.

require-remote {mode {active| passive}}| mib-retrieval| remote-loopback| link-monitoring [disabled]}

no require-remote {mode {active| passive}}| mib-retrieval| remote-loopback| link-monitoring [disabled]}

Syntax Description

mode {active passive}	Requires that active or passive mode is configured on the peer device before the OAM profile can become active.
mib-retrieval	Requires that MIB-retrieval is configured on the peer device before the OAM profile can become active.
remote-loopback	Requires that remote-loopback is configured on the peer device before the OAM profile can become active.
link-monitoring	Requires that link-monitoring feature is configured on the peer device before the OAM profile can become active.
disabled	(Optional—Interface Ethernet OAM configuration only) Overrides the Ethernet OAM profile configuration for this option and disables the feature at the specified interface.

Command Default

No default behavior or values

Command Modes

Ethernet OAM configuration (config-eoam)
Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **disabled** keyword is available only when you are configuring Ethernet OAM on an interface, and is used to override the configuration that is part of an active OAM profile.

The **disabled** keyword does not remove the configuration of the command. Use the **no** form of this command to do that.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to require that specific features are enabled before an OAM session can become active

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# require-remote mode active
RP/0/RP0/CPU0:router(config-eoam)# require-remote mib-retrieval
RP/0/RP0/CPU0:router(config-eoam)# require-remote link-monitoring
```

The following example shows how to disable requirements on a particular interface that is part of an active OAM profile:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/6/5/0
RP/0/RP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0/CPU0:router(config-if-eoam)# require-remote mode active disabled
RP/0/RP0/CPU0:router(config-if-eoam)# require-remote mib-retrieval disabled
RP/0/RP0/CPU0:router(config-if-eoam)# require-remote link-monitoring disabled
```

Related Commands

Command	Description
ethernet oam profile, on page 468	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 465	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 526	Attaches an Ethernet OAM profile to an interface.
action capabilities-conflict, on page 395	Configures what action is taken on an interface when a capabilities-conflict event occurs.
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 579	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam interfaces, on page 582	

schedule (SLA)

To schedule an operation probe in a profile, use the **schedule** command in SLA profile configuration mode. To disable a schedule, use the **no** form of this command.

Hourly Scheduling

schedule every number {hours| minutes} [first at hh:mm[:ss]] [for duration {seconds| minutes| hours}]

no schedule every number {hours| minutes} [first at hh:mm[:ss]] [for duration {seconds| minutes| hours}]

Daily Scheduling

schedule every day [at hh:mm] [for duration {seconds| minutes| hours| days}]

no schedule every day [at hh:mm] [for duration {seconds| minutes| hours| days}]

Weekly Scheduling

schedule every week on day [at hh:mm] [for duration {seconds| minutes| hours| days| week}]

no schedule every week on day [at hh:mm] [for duration {seconds| minutes| hours| days| week}]

Syntax Description

every week on day [at hh:mm][f or <i>duration</i> {seconds minutes hours days week}]	Schedules a probe one day per week, on the specified <i>day</i> , at the specified time (<i>hh:mm</i>), for the specified <i>duration</i> .
every day [at hh:mm][f or <i>duration</i> {seconds minutes hours days}	Schedules a probe every day, at the specified time (<i>hh:mm</i>), for the specified <i>duration</i> .
every number {hours minutes} first at hh:mm[:ss]	Schedules a probe every specified <i>number</i> of hours or minutes , starting at the specified time after midnight (<i>hh:mm[:ss]</i>).
every number {hours minutes} [f or <i>duration</i> {seconds minutes hours}]	Schedules a probe every specified <i>number</i> of hours or minutes , for the specified <i>duration</i> .

<i>day</i>	Day of the week. Valid values are: • Monday • Tuesday • Wednesday • Thursday • Friday • Saturday • Sunday
<i>hh:mm hh:mm[:s s]</i>	Time of day in 24 hour time: • <i>hh:mm</i> = hour:minutesexample: 22:30 • <i>hh:mm:ss</i> = hour:minutes:seconds example: 12:30:10(seconds are optional)
<i>duration</i>	Duration of probe. The ranges are : • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours • 1 day • 1 week
<i>number</i>	Number of hours or minutes . • Valid values for hours are the factors of 24: 1, 2, 3, 4, 6, 8, 12 • Valid values for minutes are the factors of 1440 (up to 90): 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 32, 36, 40, 45, 48, 60, 80, 90

Command Default

The default is every hour. If the **at** keyword is not specified, the start time of each operation is distributed uniformly within the duration of the probe. If the **for** keyword is not specified, only one single burst is sent.

Command Modes

SLA profile configuration (config-sla-prof)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Schedules are optional, but a profile may contain only one schedule.

**Note**

Any change to a schedule causes all stored data for that operation to be deleted.

Changing a schedule is equivalent to deleting an operation and creating a new operation.

The **for duration** option must be specified if (and only if) the probe is configured to send multiple packets (or bursts of packets), using the **send packet every** or **send burst every** configuration of the **send (SLA)** command. If the **send (SLA)** command is not configured for the probe, or if **send burst once** is configured, the **for duration** option must not be used. If it is used in those cases, an error is returned.

The **for duration** option must not exceed the **schedule every {week | day | number}** option.

When the “**first at hh:mm[:ss]**” option is used, the configured time is used to calculate an offset after midnight when the first probe should be sent each day. The offset is calculated by taking the configured time plus the interval. Thus, probes may be sent before the configured time.

For example, if you configure “**schedule every 6 hours first at 11:15,**” then the offset after midnight will be 5:15 (11:15 plus 6:00) and probes will be sent each day at 05:15, 11:15, 17:15 and 23:15.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following examples show how to schedule operation probes in a profile:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# schedule every week on Monday at 23:30 for 1 hour
```

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# schedule every day at 11:30 for 5 minutes
```

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# schedule every 2 hours first at 13:45:01
```

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# schedule every 6 hours for 2 hours
```

Related Commands

Command	Description
send (SLA) , on page 536	Configures the number and timing of packets sent by a probe in an operations profile.

send (SLA)

To configure the number and timing of packets sent by a probe in an operations profile, use the **send** command in SLA profile probe configuration mode. To return to the default, use the **no** form of the command.

send burst {every *number* {seconds| minutes| hours}| once} **packet count** *packets* **interval** *number* {seconds| milliseconds}

no send burst {every *number* {seconds| minutes| hours}| once} **packet count** *packets* **interval** *number* {seconds| milliseconds}

send packet {every *number* {milliseconds| seconds| minutes| hours}| once}

no send packet {every *number* {milliseconds| seconds| minutes| hours}| once}

Syntax Description

burst every <i>number</i> {seconds minutes hours}	Sends a burst of packets every specified number of seconds, minutes, or hours, where <i>number</i> is in the following range: • 1–3600 seconds • 1–1440 minutes • 1–168 hours
burst once	Sends a single burst one time.
packet count <i>packets</i>	Specifies the number of <i>packets</i> in each burst. The range is 2 to 600.
interval <i>number</i> {seconds milliseconds}	Specifies the time interval (in seconds or milliseconds) between each packet in a burst, where <i>number</i> is in the following range: • 1–30 seconds • 50–30000 milliseconds
packet every <i>number</i> {milliseconds seconds minutes hours}	Sends one packet every specified number of milliseconds, seconds, minutes, or hours, where <i>number</i> is in the following range: • 1–3600 seconds • 1–1440 minutes • 1–168 hours • 50–10000 milliseconds
packet once	Sends a single packet one time.

Command Default

If the operation is configured to measure jitter or data packet loss, the default is to send a single burst of 2 packets with a second interval between the packets.

If the operation is configured to measure synthetic packet loss, the default is to send a single burst of 10 packets with a 100 millisecond interval between the packets.

If the operation does not calculate jitter, data, or synthetic packet loss, the default is to send a single packet one time.

Command Modes

SLA profile probe configuration (config-sla-prof-pb)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

The total length of a burst is the packet count multiplied by the interval and must not exceed 1 minute.

The minimum **interval** supported is platform and packet-type dependent, so certain a configuration may cause an error even if it falls within the specified limits. In the case of Ethernet SLA, the shortest interval for packet types not used for synthetic loss measurement is 100ms.

When **burst once** is sent, a single burst is sent at the start of the probe. If the schedule defines a duration for the probe, a configuration warning is flagged. The same is true if the default is in effect.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

These examples show how to configure the types of packets sent by a probe in an operations profile:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0/CPU0:router(config-sla-prof-pb)# send burst every 60 seconds packet count 30
interval 1 second
RP/0/RP0/CPU0:router(config-sla-prof-pb)#

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0/CPU0:router(config-sla-prof-pb)# send burst once packet count 2 interval 1 second
RP/0/RP0/CPU0:router(config-sla-prof-pb)#
```

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0/CPU0:router(config-sla-prof-pb)# send packet every 1 second
```

service

To associate a service with a domain and enter CFM domain service configuration mode, use the **service** command in CFM domain configuration mode. To remove a service from a domain, use the **no** form of this command.

service *service-name* {**down-meps**| **xconnect group** *xconnect-group-name* **p2p** *xconnect-name*} [**id** | [**string** *text*]] [**number** *number*]] [**vlan-id** *id-number*]] [**vpn-id** *oui-vpnid*]]

no service *service-name* {**down-meps**| **xconnect group** *xconnect-group-name* **p2p** *xconnect-name*} [**id** | [**string** *text*]] [**number** *number*]] [**vlan-id** *id-number*]] [**vpn-id** *oui-vpnid*]]

Syntax Description

<i>service-name</i>	Administrative name for the service. Case sensitive ASCII string up to 80 characters. Used in conjunction with one of the following service types: • down-meps • xconnect
down-meps	Specifies that all MEPs are down and no MIPs are permitted.
xconnect	Specifies the use of a cross connect. Used in conjunction with group and p2p . Note When xconnect is specified, all MEPs are up and MIPs are permitted.
group <i>xconnect-group-name</i>	Specifies the name of the cross connect group.
p2p <i>xconnect-name</i>	Specifies the name of the point-to-point cross connect and enters the Ethernet CFM domain service mode.
id	(Optional) Service identifier. Valid service identifiers are: • number <i>number</i>—Number from 0 to 65535. • string <i>text</i>—String length no longer than 46 minus MDID length. • vlan-id <i>id-number</i>—Number from 1 to 4094. • vpn-id <i>oui-vpnid</i> —VPN ID in RFC 2685 format (HHH:HHHH)

Command Default

If **id** is not specified, the service name is used as the Short MA name.

Command Modes

CFM domain configuration (config-cfm-dmn)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The Short MA Name is the second part of the Maintenance Association Identifier (MAID) in CFM frames. If the Short MA Name (service id) is not specified, the service administrative name is used by default.

When configuring the **service** command, consider the following restrictions:

- The **bridge group** and **bridge-domain** keyword options appear in the software, but they are unsupported.
- The **service xconnect group p2p** form of the command is not supported for L2TPv3 cross-connect types. The following example shows a sample L2TPv3 configuration that is not supported when used with the **service xconnect group** command:
In this example, a corresponding CFM configuration of the **service xconnect group 1 p2p 1** command will not work.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to specify that all MEPs are down and no MIPs are permitted, and enter CFM domain service configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Serv_1 down-meps
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)#
```

The following example shows how to associate a cross connect service to a domain and enter CFM domain service configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)#
```


Related Commands

Command	Description
domain , on page 457	Creates and names a container for all domain configurations and enter the CFM domain configuration mode.
ethernet cfm (global) , on page 461	Enters Ethernet CFM configuration mode.
p2p	Enters p2p configuration mode to configure point-to-point cross-connects.
show ethernet cfm configuration-errors , on page 546	Displays information about errors that are preventing configured cfm operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points , on page 553	Displays all the maintenance points that have been created.
show ethernet cfm local meps , on page 556	Displays information about local MEPs.
show ethernet cfm peer meps , on page 562	Displays other MEPs detected by a local MEP.
xconnect group	Configures a cross-connect group.

show efd interface

To display all interfaces that are shut down because of Ethernet Fault Detection (EFD), or to display whether a specific interface is shut down because of EFD, use the **show efd interface** command in EXEC mode.

show efd interface [*type interface-path-id*]

Syntax Description

<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

If no parameters are specified, all interfaces that are shut down because of EFD are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If this command is issued when no EFD errors are detected, the system displays the following message:

```
< date time >
No matching interfaces with EFD-shutdown triggered
```

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display all interfaces that are shut down because of Ethernet Fault Detection (EFD):

```
RP/0/RP0/CPU0:router# show efd interfaces
```

```
Server VLAN MA
=====
Interface      Clients
-----
GigE0/0/0/0.0  CFM
```

Related Commands

Command	Description
efd , on page 459	Enables EFD on all down MEPs in a down MEPs service.
log efd , on page 504	Enables logging of EFD state changes to an interface (such as when an interface is shut down or brought up via EFD).

show ethernet cfm ccm-learning-database

To display the Continuity Check Message (CCM) learning database, use the **show ethernet cfm ccm-learning-database** command in EXEC configuration mode.

show ethernet cfm ccm-learning-database [*location node-id*]

Syntax Description

location <i>node-id</i>	(Optional) Displays the CFM CCM learning database for the designated node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

All CFM ccm-learning-databases on all interfaces are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The CCM Learning Database is populated by MEPs and MIPs that have received continuity-check messages (CCMs). The information in the CCM Learning Database is used to reply to traceroutes when no applicable entries are found in the main MAC learning table.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display all the CFM CCM learning databases on all interfaces:

```
RP/0/RP0/CPU0:router# show ethernet cfm ccm-learning-database
```

```
Location 0/0/CPU0:
```

Domain/Level	Service	Source MAC	Interface
foo/2	foo	0001.0203.0401	Gi0/0/0/0
foo/2	foo	0001.0203.0402	PW

Location 0/1/CPU0:

Domain/Level	Service	Source MAC	Interface
foo/2	foo	0001.0203.0401	XC ID: 0xff000002

Table 27: show ethernet cfm ccm-learning-database Field Descriptions

Domain/Level	The domain name and the level of the domain for the maintenance point that received the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages received by maintenance points in this domain.
Service	The name of the service for the maintenance point that received the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages received by maintenance points in this domain.
Source MAC	Source MAC address in the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages targeted at this MAC address.
Interface	The interface through which the CCM entered the router. This will be one of the following: • An interface or sub-interface name • A pseudowire identification (neighbor address and PW ID) • PW – Indicates the CCM was received through the PW in a cross-connect • XC ID – the internal cross-connect ID value, indicating that the CCM was received through an interface that no longer exists, or is no longer in L2 mode.

show ethernet cfm configuration-errors

To display information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred, use the **show ethernet cfm configuration-errors** command in EXEC mode.

show ethernet cfm configuration-errors [**domain** *domain-name*] [**interface** *type interface-path-id*]

Syntax Description

domain <i>domain-name</i>	(Optional) Displays information about the specified CFM domain name.
interface <i>type</i>	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

All CFM configuration errors on all domains are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display all the CFM configuration errors on all domains:

```
RP/0/RP0/CPU0:router# show ethernet cfm configuration-errors
```

```
Domain fig (level 5), Service bay
* MIP creation configured using bridge-domain blort, but bridge-domain blort does not
exist.
* An Up MEP is configured for this domain on interface GigabitEthernet0/1/2/3.234 and an
Up MEP is also configured for domain blort, which is at the same level (5).
* A MEP is configured on interface GigabitEthernet0/3/2/1.1 for this domain/service, which
has CC interval 100ms, but the lowest interval supported on that interface is 1s.
```

Related Commands

Command	Description
ethernet cfm (global), on page 461	Enters CFM configuration mode.
ethernet cfm (interface), on page 463	Enters interface CFM configuration mode.
traceroute ethernet cfm, on page 609	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet cfm interfaces ais

To display the information about interfaces that are currently transmitting Alarm Indication Signal (AIS), use the **show ethernet cfm interfaces ais** command in EXEC mode.

show ethernet cfm interfaces [*type interface-path-id*] **ais** [**location** *node-id*]

Syntax Description

<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>node-id</i>	(Optional) Displays information about the node location specified as <i>rack / slot / module</i> . Location cannot be specified if you configure an interface type.

Command Default

If no parameters are specified, information for all AIS interfaces is displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

The **location** keyword cannot be specified if an interface has been specified.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display the information published in the Interface AIS table:

```
RP/0/RP0/CPU0:router# show ethernet cfm interfaces ais
```

Defects (from at least one peer MEP):

```
A - AIS received           I - Wrong interval
R - Remote Defect received V - Wrong Level
L - Loop (our MAC received) T - Timed out (archived)
C - Config (our ID received) M - Missing (cross-check)
X - Cross-connect (wrong MAID) U - Unexpected (cross-check)
P - Peer port down         D - Local port down
```

Interface (State)	AIS Dir	Trigger	Via Levels	Transmission			Packets
		L Defects		L	Int	Last started	
Gi0/1/0/0.234 (Up)	Dn	5 RPC	6	7	1s	01:32:56 ago	5576
Gi0/1/0/0.567 (Up)	Up	0 M	2,3	5	1s	00:16:23 ago	983
Gi0/1/0/1.1 (Dn)	Up	D		7	60s	01:02:44 ago	3764
Gi0/1/0/2 (Up)	Dn	0 RX	1!				

Table 28: show ethernet cfm interfaces ais Field Descriptions

Interface (State)	The name and state of the interface.
AIS dir	The direction that the AIS packets are transmitted, up or down.
Trigger L	The level of the lowest MEP that is transmitting AIS. The field is blank if there are no down MEPs on the interface, and AIS is being transmitted due to configuration on the interface itself.
Trigger Defects	Defects detected by the lowest MEP transmitting AIS.
Via Levels	The levels of any MEPs on the interface that are receiving AIS from a lower MEP, and potentially re-transmitting the signal. If the highest MEP is not re-transmitting the signal, the list of levels is ended using an exclamation point.
Transmission L	The level at which AIS is being transmitted outside of the interface, via a MIP. The field is blank if this is not occurring.
Transmission Int	The interval at which AIS is being transmitted outside of the interface via a MIP. The field is blank if this is not occurring.
Transmission last started	If AIS is being transmitted outside of the interface, the time that the signal started. The field is blank if this is not occurring.

Transmission packets	If AIS is being transmitted outside of the interface, the number of packets sent by the transmitting MEP since it was created or since its counters were last cleared. The field is blank if this is not occurring.

Related Commands

Command	Description
ais transmission, on page 417	Configures AIS transmission for a CFM domain service.
log ais, on page 497	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 419	Configures AIS transmission on a CFM interface.
show ethernet cfm local meps, on page 556	Displays information about local MEPS.

show ethernet cfm interfaces statistics

To display the per-interface counters for Ethernet Connectivity Fault Management (CFM), use the **show ethernet cfm interfaces statistics** command in EXEC mode.

show ethernet cfm interfaces [*type interface-path-id*] **statistics** [**location** *node-id*]

Syntax Description

<i>type</i>	(Optional) Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>node-id</i>	(Optional) Displays information about the node location specified as <i>rack / slot / module</i> . Location cannot be specified if you configure an interface type.

Command Default

All CFM counters from all interfaces are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



Note

The location cannot be specified if a particular interface is specified.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows all the CFM counters on all interfaces:

```
RP/0/RP0/CPU0:router# show ethernet cfm interfaces statistics
Location 0/1/CPU0:
```

Interface	Malformed	Dropped	Last Malformed Reason
-----	-----	-----	-----
Gi0/1/0/3.185	0	0	
Gi0/1/0/7.185	0	0	
Gi0/1/0/7.187	0	0	

Table 29: show ethernet cfm statistics Field Descriptions

Interface	Name of the interface.
Malformed	Number of packets that have been received at this interface that have been found to be non-compliant with the packet formats specified in IEEE 802.1ag and ITU-T Y.1731.
Dropped	Number of valid (well-formed) packets that have been received at this interface, that have been dropped in software. Packets may be dropped for the following reasons: • Packet has an unknown operation code, and reached a MEP. • Packet dropped at a MEP because it has a lower CFM level than the MEP. • Packet could not be forwarded because the interface is STP blocked. • Packet could not be forwarded because it is destined for this interface.
Last Malformed Reason	Operation code for the last malformed packet received, and the reason that it was found to be malformed. If no malformed packets have been received, this field is blank.

Related Commands

Command	Description
clear ethernet cfm interface statistics , on page 426	Clears the counters for an Ethernet CFM interface.

show ethernet cfm local maintenance-points

To display a list of local maintenance points, use the **show ethernet cfm local maintenance-points** command in EXEC mode.

show ethernet cfm local maintenance-points [**domain** *domain-name* [**service** *service-name*]] **interface** *type* *interface-path-id* [**mep**| **mip**]

Syntax Description

domain <i>domain-name</i>	(Optional) Displays information about the specified domain, where <i>domain-name</i> is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service <i>service-name</i>	(Optional) Displays information about the specified service, where <i>service-name</i> is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
interface <i>type</i>	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
mep	(Optional) Displays information about maintenance end points (MEPs).
mip	(Optional) Displays information about maintenance intermediate points (MIPs).

Command Default

All maintenance points from all interfaces are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display maintenance points:

```
RP/0/RP0/CPU0:router# show ethernet cfm local maintenance-points
```

Domain/Level	Service	Interface	Type	ID	MAC
bar/0	bar	Gi0/0/0/0	Dn MEP	1	03:04:00
baz/4	baz	Gi0/0/0/1.1	MIP		03:04:01
baz/4	baz	Gi0/0/0/2	MIP		03:04:02
foo/?	foo	Gi0/0/0/3	MEP	1	03:04:03!
qux/2	qux	Gi0/0/0/1.1	Up MEP	10	03:04:01
qux/2	qux	Gi0/0/0/2	Up MEP	11	03:04:02

Table 30: show ethernet cfm local maintenance-points Field Descriptions

Domain/Level	The domain name and the level of the domain. If the domain is not configured globally, a question mark (?) is displayed for the Level.
Service	The name of the service.
Interface	The interface containing the maintenance point.
Type	The type of maintenance point: • MIP • Up MEP • Down MEP • MEP—If the MEP belongs to a service that is not configured globally, the type cannot be determined and just MEP is displayed.
ID	The configured MEP ID. Note Since MIPs do not have an ID, this column is blank for MIPs.
MAC	The last 3 octets of the interface MAC address. Note The first three octets are typically the Cisco OUI.
Note	If the MEP has a configuration error, an exclamation point (!) is displayed at the end of the line in the display output.

Related Commands

Command	Description
show ethernet cfm local meps, on page 556	Displays information about local MEPs.
show ethernet cfm peer meps, on page 562	Displays information about maintenance end points (MEPs) for peer MEPs.
traceroute cache, on page 607	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
traceroute ethernet cfm, on page 609	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet cfm local meps

To display information about local maintenance end points (MEPs), use the **show ethernet cfm local meps** command in EXEC mode.

show ethernet cfm local meps [**domain** *domain-name* [**service** *service-name* [**mep-id** *id*]]] **interface** *type* *interface-path-id* [**domain** *domain-name*]] [**errors** [**detail**| **verbose**]] **detail**| **verbose**]

Syntax Description

domain <i>domain-name</i>	(Optional) Displays information about the specified CFM domain, where <i>domain-name</i> is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service <i>service-name</i>	(Optional) Displays information about the specified service, where <i>service-name</i> is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
interface <i>type</i>	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
mep-id <i>id</i>	(Optional) Displays information about the specified MEP, where <i>id</i> is a number of a local maintenance end point (MEP). The range is 1 to 8191.
errors	(Optional) Displays information about peer MEPs with errors.
detail	(Optional) Displays detailed information.
verbose	(Optional) Displays detailed information, plus counters for each type of CFM packet.

Command Default

Brief information is displayed for all local MEPs.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.1	New output fields were added for AIS.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

All MEPs are displayed in the **show ethernet cfm local meps** command output, unless they have configuration errors.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows sample output of the default statistics for local MEPs without any filtering:

```
RP/0/RP0/CPU0:router# show ethernet cfm local meps
```

```

A - AIS received           I - Wrong interval
R - Remote Defect received V - Wrong Level
L - Loop (our MAC received) T - Timed out (archived)
C - Config (our ID received) M - Missing (cross-check)
X - Cross-connect (wrong MAID) U - Unexpected (cross-check)
P - Peer port down

```

```

Domain foo (level 6), Service bar
  ID Interface (State)   Dir MEPS/Err RD Defects AIS
-----
  100 Gi1/1/0/1.234 (Up) Up    0/0   N   A       L7

```

```

Domain fred (level 5), Service barney
  ID Interface (State)   Dir MEPS/Err RD Defects AIS
-----
  2 Gi0/1/0/0.234 (Up)  Up    3/2   Y  RPC      L6

```

```
RP/0/0/CPU0:router# show ethernet cfm local meps
```

```

A - AIS received           I - Wrong interval
R - Remote Defect received V - Wrong Level
L - Loop (our MAC received) T - Timed out (archived)
C - Config (our ID received) M - Missing (cross-check)
X - Cross-connect (wrong MAID) U - Unexpected (cross-check)
P - Peer port down

```

```

Domain foo (level 6), Service bar
  ID Interface (State)   Dir MEPS/Err RD Defects AIS
-----
  100 Gi1/1/0/1.234 (Up) Up    0/0   N   A

```

```

Domain fred (level 5), Service barney
  ID Interface (State)   Dir MEPS/Err RD Defects AIS
-----
  2 Gi0/1/0/0.234 (Up)  Up    3/2   Y  RPC

```

Table 31: show ethernet cfm local meps Field Descriptions

ID	Configured MEP ID of the MEP.

Interface (State)	Interface that the MEP is configured under, and the state of the interface. The states are derived from the interface state, the Ethernet Link OAM interworking state, and the Spanning Tree Protocol (STP) state. The following states are reported: • Up – Interface Up, Ethernet Link OAM Up, STP Up • Down – Interface Down or Admin Down • Test – Interface Up, Ethernet Link OAM loopback mode • Blkd – Interface Up, Ethernet Link OAM Up, STP Blocked • Otherwise, the interface state.
Dir	Direction of the MEP.
RD	Remote Defect. Y (yes) indicates that a remote defect is detected on at least one peer MEP. In which case, the RDI bit is set in outgoing CCM messages. Otherwise, N (no).
MEPs	Total number of peer MEPs sending CCMs to the local MEP.
Err	Number of peer MEPs for which at least one error has been detected.
Defects	Types of errors detected. Each error is listed as a single character. Multiple errors are listed if they are from the same MEP. Possible errors are listed at the top of the display output of the command.
AIS	Alarm Indication Signal. If AIS is configured for the service, the configured level is displayed when an alarm is signaled. If AIS is not configured for the service, or if no alarm is currently signaled, this field is blank.

```
RP/0/RP0/CPU0:router# show ethernet cfm local meps domain foo service bar
```

```

A - AIS received           I - Wrong interval
R - Remote Defect received V - Wrong Level
L - Loop (our MAC received) T - Timed out (archived)
C - Config (our ID received) M - Missing (cross-check)
X - Cross-connect (wrong MAID) U - Unexpected (cross-check)
P - Peer port down

```

```
Domain foo (level 6), Service bar
```

```

-----
ID Interface (State)      Dir MEPs/Err RD Defects AIS
-----
100 Gi1/1/0/1.234 (Up)   Up      0/0   N   A      L7

RP/0/0/CPU0:router# show ethernet cfm local meps domain foo service bar

A - AIS received           I - Wrong interval
R - Remote Defect received V - Wrong Level
L - Loop (our MAC received) T - Timed out (archived)
C - Config (our ID received) M - Missing (cross-check)
X - Cross-connect (wrong MAID) U - Unexpected (cross-check)
P - Peer port down

Domain foo (level 6), Service bar
ID Interface (State)      Dir MEPs/Err RD Defects AIS
-----
100 Gi1/1/0/1.234 (Up)   Up      0/0   N   X

```

The following example shows sample output of detailed statistics for local MEPs:



Note

The Discarded CCMs field is not displayed when the number is zero (0). It is unusual for the count of discarded CCMs to be anything other than zero, since CCMs are only discarded when the limit on the number of peer MEPs is reached. The Peer MEPs field is always displayed, but the counts are always zero when continuity check is not enabled.

```

RP/0/RP0/CPU0:router# show ethernet cfm local meps detail

Domain foo (level 6), Service bar
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 100
=====
Interface state: Up      MAC address: 1122.3344.5566
Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)

CCM generation enabled: No
AIS generation enabled: Yes (level: 7, interval: 1s)
Sending AIS:           Yes (started 01:32:56 ago)
Receiving AIS:         Yes (from lower MEP, started 01:32:56 ago)

Domain fred (level 5), Service barney
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 2
=====
Interface state: Up      MAC address: 1122.3344.5566
Peer MEPs: 3 up, 2 with errors, 0 timed out (archived)
Cross-check defects: 0 missing, 0 unexpected

CCM generation enabled: Yes (Remote Defect detected: Yes)
CCM defects detected:  R - Remote Defect received
                      P - Peer port down
                      C - Config (our ID received)
AIS generation enabled: Yes (level: 6, interval: 1s)
Sending AIS:           Yes (to higher MEP, started 01:32:56 ago)
Receiving AIS:         No

RP/0/0/CPU0:router# show ethernet cfm local meps detail

Domain foo (level 6), Service bar
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 100
=====
Interface state: Up      MAC address: 1122.3344.5566
Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)

CCM generation enabled: No
AIS generation enabled: No
Sending AIS:           No
Receiving AIS:         No

Domain fred (level 5), Service barney

```

show ethernet cfm local meps

```

Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 2
=====
Interface state: Up      MAC address: 1122.3344.5566
Peer MEPS: 3 up, 2 with errors, 0 timed out (archived)
Cross-check defects: 0 missing, 0 unexpected

CCM generation enabled: Yes (Remote Defect detected: Yes)
CCM defects detected:   R - Remote Defect received
                       P - Peer port down
                       C - Config (our ID received)

AIS generation enabled: No
Sending AIS:            No
Receiving AIS:          No

```

The following example shows sample output of detailed statistics for local MEPS:

```

RP/0/RP0/CPU0:router# show ethernet cfm local meps verbose

Domain foo (level 6), Service bar
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 100
=====
Interface state: Up      MAC address: 1122.3344.5566
Peer MEPS: 0 up, 0 with errors, 0 timed out (archived)

CCM generation enabled: No
AIS generation enabled: Yes (level: 7, interval: 1s)
Sending AIS:            Yes (started 01:32:56 ago)
Receiving AIS:          Yes (from lower MEP, started 01:32:56 ago)

Packet      Sent      Received
-----
CCM          0          0 (out of seq: 0)
LBM          0          0
LBR          0          0 (out of seq: 0, with bad data: 0)
AIS        5576          0
LCK          -          0

Domain fred (level 5), Service barney
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 2
=====
Interface state: Up      MAC address: 1122.3344.5566
Peer MEPS: 3 up, 2 with errors, 0 timed out (archived)
Cross-check defects: 0 missing, 0 unexpected

CCM generation enabled: Yes (Remote Defect detected: Yes)
CCM defects detected:   R - Remote Defect received
                       P - Peer port down
                       C - Config (our ID received)

AIS generation enabled: Yes (level: 6, interval: 1s)
Sending AIS:            Yes (to higher MEP, started 01:32:56 ago)
Receiving AIS:          No

Packet      Sent      Received
-----
CCM        12345        67890 (out of seq: 6, discarded: 10)
LBM         5          0
LBR         0          5 (out of seq: 0, with bad data: 0)
AIS         0        46910
LCK         -          0

```

Related Commands

Command	Description
show ethernet cfm local maintenance-points , on page 553	Displays a list of local maintenance points.
show ethernet cfm peer meps , on page 562	Displays information about maintenance end points (MEPs) for peer MEPS.

Command	Description
traceroute ethernet cfm , on page 609	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet cfm peer meps

To display information about maintenance end points (MEPs) for peer MEPs, use the **show ethernet cfm peer meps** command in EXEC mode.

show ethernet cfm peer meps [**domain** *domain-name* [**service** *service-name* [**local mep-id** *id* [**peer** {**mep-id** *id* | **mac-address** *H . H . H*}]]]] | **interface** *type interface-path-id* [**domain** *domain-name* [**peer** {**mep-id** *id* | **mac-address** *H . H . H*}]]]] [**cross-check** [**missing** | **unexpected**] | **errors**] [**detail**]

Syntax Description

cross-check	(Optional) Displays information about peer MEPs with cross-check errors.
detail	(Optional) Displays detailed information.
domain <i>domain-name</i>	(Optional) Displays information about a CFM domain, where <i>domain-name</i> is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
errors	(Optional) Displays information about peer MEPs with errors.
interface <i>type</i>	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
local mep-id <i>id</i>	(Optional) Displays information about a local MEP, where <i>id</i> is the number of the MEP.
<i>missing</i>	(Optional) Displays information about peer MEPs that are missing.
peer mep-id <i>id</i>	(Optional) Displays information about a peer MEP, where <i>id</i> is the number of the MEP.
peer mac-address <i>H.H.H</i>	(Optional) Displays information about a peer MEP, where <i>H.H.H</i> is the hexadecimal address of the MEP.
service <i>service-name</i>	(Optional) Displays information about a CFM service, where <i>service-name</i> is a string of a maximum of 154 characters that identifies the maintenance association to which the maintenance points belong.
unexpected	(Optional) Displays information about unexpected peer MEPs.

Command Default

Peer MEPs for all domains are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows sample output of MEPs detected by a local MEP:

```
RP/0/RP0/CPU0:router# show ethernet cfm peer meps
```

Flags:

```
> - Ok
R - Remote Defect received
L - Loop (our MAC received)
C - Config (our ID received)
X - Cross-connect (wrong MAID)
* - Multiple errors received
I - Wrong interval
V - Wrong level
T - Timed out
M - Missing (cross-check)
U - Unexpected (cross-check)
```

```
Domain dom3 (level 5), Service ser3
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
```

St	ID	MAC Address	Port	Up/Downtime	CcmRcvd	SeqErr	RDI	Error
V	10	0001.0203.0403	Up	00:01:35	2	0	0	2

```
Domain dom4 (level 2), Service ser4
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
```

St	ID	MAC Address	Port	Up/Downtime	CcmRcvd	SeqErr	RDI	Error
>	20	0001.0203.0402	Up	00:00:03	4	1	0	0
>	21	0001.0203.0403	Up	00:00:04	3	0	0	0

```
Domain dom5 (level 2), Service dom5
```

Table 32: show ethernet cfm peer meps Field Descriptions

St	Status: one or two characters, representing the states listed at the top of the output.
ID	Peer MEP ID

MAC address	Peer MAC Address. If this entry is a configured cross-check MEP, with no MAC address specified, and no CCMs are currently being received from a peer MEP with a matching MEP ID, then this field is blank.
Port	Port state of the peer, based on the Port Status and Interface Status TLVs. If no TLVs or CCMs have been received, this field is blank. Otherwise, the port status is displayed—unless it is Up. If the port status is Up, then the interface status is displayed.
Up/Downtime	Time since the peer MEP last came up or went down. If CCMs are currently being received, it is the time since the peer MEP last came up, which is the time since the first CCM was received. If CCMs are not currently being received, it is the time since the peer MEP last went down, which is the time since the loss threshold was exceeded and a loss of continuity was detected.
CcmRcvd	Total number of CCMs received from this peer MEP.
SeqErr	Number of CCMs received out-of-sequence.
RDI	Number of CCMs received with the RDI bit set.
Error	Number of CCMs received with CCM defects, such as: • Invalid level error • Maintenance Association Identifier (MAID) error • Interval error • Received with out MEP ID error • Invalid source MAC error

The following example shows sample detailed output of MEPs detected by a local MEP:

```
RP/0/RP0/CPU0:router# show ethernet cfm peer meps detail
```

```
Domain dom3 (level 5), Service ser3
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
=====
Peer MEP-ID 10, MAC 0001.0203.0403
  CFM state: Wrong level, for 00:01:34
  Port state: Up
  CCM defects detected:    V - Wrong Level
  CCMs received: 5
```



```

Out-of-sequence:          0
Remote Defect received:    5
Wrong Level:              0
Cross-connect (wrong MAID): 0
Wrong Interval:          5
Loop (our MAC received):   0
Config (our ID received):  0
Last CCM received 00:00:06 ago:
Level: 4, Version: 0, Interval: 1min
Sequence number: 5, MEP-ID: 10
MAID: String: dom3, String: ser3
Port status: Up, Interface status: Up

Domain dom4 (level 2), Service ser4
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
=====
Peer MEP-ID 20, MAC 0001.0203.0402
CFM state: Ok, for 00:00:04
Port state: Up
CCMs received: 7
Out-of-sequence:          1
Remote Defect received:    0
Wrong Level:              0
Cross-connect (wrong MAID): 0
Wrong Interval:          0
Loop (our MAC received):   0
Config (our ID received):  0
Last CCM received 00:00:04 ago:
Level: 2, Version: 0, Interval: 10s
Sequence number: 1, MEP-ID: 20
MAID: String: dom4, String: ser4
Chassis ID: Local: ios; Management address: 'Not specified'
Port status: Up, Interface status: Up

Peer MEP-ID 21, MAC 0001.0203.0403
CFM state: Ok, for 00:00:05
Port state: Up
CCMs received: 6
Out-of-sequence:          0
Remote Defect received:    0
Wrong Level:              0
Cross-connect (wrong MAID): 0
Wrong Interval:          0
Loop (our MAC received):   0
Config (our ID received):  0
Last CCM received 00:00:05 ago:
Level: 2, Version: 0, Interval: 10s
Sequence number: 1, MEP-ID: 21
MAID: String: dom4, String: ser4
Port status: Up, Interface status: Up

Domain dom5 (level 2), Service ser5
Up MEP on Standby Bundle-Ether 1 MEP-ID 1
=====
Peer MEP-ID 600, MAC 0001.0203.0401
CFM state: Ok (Standby), for 00:00:08, RDI received
Port state: Down
CCM defects detected:      Defects below ignored on local standby MEP
                           I - Wrong Interval
                           R - Remote Defect received

CCMs received: 5
Out-of-sequence:          0
Remote Defect received:    5
Wrong Level:              0
Cross-connect W(wrong MAID): 0
Wrong Interval:          5
Loop (our MAC received):   0
Config (our ID received):  0
Last CCM received 00:00:08 ago:
Level: 2, Version: 0, Interval: 10s
Sequence number: 1, MEP-ID: 600

```

show ethernet cfm peer meps

```

MAID: DNS-like: dom5, String: ser5
Chassis ID: Local: ios; Management address: 'Not specified'
Port status: Up, Interface status: Down

Peer MEP-ID 601, MAC 0001.0203.0402
CFM state: Timed Out (Standby), for 00:15:14, RDI received
Port state: Down
CCM defects detected:      Defects below ignored on local standby MEP
                          I - Wrong Interval
                          R - Remote Defect received
                          T - Timed Out
                          P - Peer port down

CCMs received: 2
  Out-of-sequence:          0
  Remote Defect received:    2
  Wrong Level:              0
  Cross-connect (wrong MAID): 0
  Wrong Interval:           2
  Loop (our MAC received):   0
  Config (our ID received):  0
Last CCM received 00:15:49 ago:
  Level: 2, Version: 0, Interval: 10s
  Sequence number: 1, MEP-ID: 600
  MAID: DNS-like: dom5, String: ser5
  Chassis ID: Local: ios; Management address: 'Not specified'
  Port status: Up, Interface status: Down

```

Table 33: show ethernet cfm peer meps detail Field Descriptions

CFM state	State of the peer MEP, how long it has been up or down, and whether the RDI bit was set in the last received CCM. The following possible states are shown if CCMs are currently being received: • Missing • Timed out—No CCMs have been received for the loss time • Ok • Indication of a defect
Port state	Port state of the peer, based on the Port Status and Interface Status TLVs. If no TLVs or CCMs have been received, this field is blank. Otherwise, the port status is displayed—unless it is Up. If the port status is Up, then the interface status is displayed.

CCM defects detected	Types of CCM defects that have been detected. The possible defects are: • Remote Defect received—The last CCM received from the peer had the RDI bit set. • Loop (our MAC received)—CCMs were received from a peer with the same MAC address as the local MEP. • Config (our ID received)—CCMs were received from a peer with the same MEP ID as the local MEP. • Cross-connect (wrong MAID)—The last CCM received from the peer contained a domain/service identified that did not match the locally configured domain/service identifier. • Peer port down—The last CCM received from the peer contained an Interface Status indicating that the interface on the peer was not up. • Wrong interval—The last CCM received contained a CCM interval that did not match the locally configured CCM interval. • Wrong level—The last CCM received was for a lower level than the level of the local MEP. • Timed out—No CCMs have been received within the loss time. • Missing (cross-check)—Cross-check is configured and lists this peer MEP, but no CCMs have been received within the loss time. • Unexpected (cross-check)—Cross check is configured for this service and does not list this peer MEP, but CCMs have been received from it within the loss time.
CCMs received	Number of CCMs received in total, by defect type.
Last CCM received	How long ago the last CCM was received, and a full decode of its contents. Any unknown TLVs are displayed in hexadecimal.

Related Commands

Command	Description
show ethernet cfm local maintenance-points , on page 553	Displays a list of local maintenance points.

Command	Description
show ethernet cfm local meps, on page 556	Displays information about local MEPs.
traceroute ethernet cfm, on page 609	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet cfm traceroute-cache

To display the contents of the traceroute cache, use the **show ethernet cfm traceroute-cache** command in EXEC mode.

```
{show ethernet cfm traceroute-cache [[domain domain-name] [service service-name] [local mep-id id]
[transaction-id id]] interface type interface-path-id [[domain domain-name] [transaction-id id]]
[exploratory|targeted] [status {complete|incomplete}] [detail]}
```

Syntax Description

domain <i>domain-name</i>	(Optional) Displays information about a CFM domain, where <i>domain-name</i> is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service <i>service-name</i>	(Optional) Displays information about a CFM service, where <i>service-name</i> is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
local mep-id <i>id</i>	(Optional) Displays information for the specified local maintenance end point (MEP). The range for MEP ID numbers is 1 to 8191.
transaction-id <i>id</i>	(Optional) Displays information for the specified transaction.
interface <i>type</i>	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	(Optional) Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
exploratory	(Optional) Displays information for exploratory traceroutes.
targeted	(Optional) Displays information for traceroutes that are not exploratory, but explicitly mapped.
status	(Optional) Displays status information.
complete	(Optional) Displays status information for traceroutes that have received all replies.
incomplete	(Optional) Displays status information for traceroutes that are still receiving replies.
detail	(Optional) Displays detailed information.

Command Default Shows output for the default traceroute.

Command Modes EXEC (#)

Command History	Release	Modification
	Release 3.9.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show ethernet cfm traceroute-cache** command to display the contents of the traceroute cache; for example, to see the maintenance intermediate points (MIPs) and maintenance end points (MEPs) of a domain as they were discovered. The data is historic. The traceroute cache stores entries from previous traceroute operations.

In the output, the traceroutes sourced from each local MEP are listed. The heading for the local MEP contains the domain name and level, service name, MEP ID and interface name.

Task ID	Task ID	Operations
	ethernet-services	read

Examples The following example shows sample output for the **show ethernet cfm traceroute-cache** command:

```
RP/0/RP0/CPU0:router# show ethernet cfm traceroute-cache

Traceroutes in domain bar (level 4), service bar
Source: MEP-ID 1, interface GigabitEthernet0/0/0/0
=====
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:

Hop  Hostname/Last          Ingress MAC/name      Egress MAC/Name       Relay
-----
  1  ios
     0000-0001.0203.0400    0001.0203.0400 [Down]
                               Gi0/0/0/0
  2  abc
     ios                    0001.0203.0401 [Ok]
                               Not present
  3  bcd
     abc                    0001.0203.0402 [Ok]
                               GigE0/0
Replies dropped: 0

Traceroutes in domain foo (level 2), service foo
Source: MEP-ID 1, interface GigabitEthernet0/0/0/0
=====
Traceroute at 2009-05-18 12:03:31 to 0001.0203.0403,
TTL 64, Trans ID 1:
```

```

Hop  Hostname/Last          Ingress MAC/name      Egress MAC/Name      Relay
-----
  1  abc                    0001.0203.0401 [Ok]
      0000-0001.0203.0400  Not present
  2  bob                    0001.0203.0402 [Ok]
      abc                  Gi0/1/0/2.3
  3  cba                    0001.0203.0403 [Ok]
      bob                  Gi0/2/0/3.45
Replies dropped: 0

```

Traceroute at 2009-05-18 12:15:47 to 0001.0203.0409,
TTL 64, Trans ID 3, automatic:
00:00:05 remaining

Traceroute at 2009-05-18 12:20:10 explore to ffff.ffff.ffff,
TTL 64, Trans ID 4, Timeout auto, Reply Filter Default:

```

Hop      Hostname/Last          Ingr/Egr MAC/name      Relay
-----
  1      abc                    Ingress  0015.0000.323f [Ok]  FDB
      0000-0001.0203.0400
  2      abc                    Egress   0015.0000.323e [Ok]  FDB
      abc                    Te0/1/0/0.1
  3      0002-0016.eeee.1234    Ingress  0016.eeee.1234 [Ok]  FDB
      abc                    Te0/4.23
  4      0000-0016.eeee.4321    Egress   0016.eeee.4321 [Ok]  FDB
      0002-0016.eeee.1234
  5      rtr                      Ingress  0015.0000.f123 [Ok]  FDB
      0002-00.16.eeee.4321
  2      abc                    Egress   0015.0000.323d [Ok]  FDB
      abc                    Te0/1/0/1.1
  3      pe2                     Ingress  0017.0000.cf01 [Ok]  FDB
      abc                    Te0/0/2/0/1.450
  4      pe2                     Egress   0017.0000.cf01 [Ok]  Drop
      pe2                    Gi0/0/0/0.451
  4      pe2                     Egress   0017.0000.cf01 [Ok]  FDB
      pe2                    Gi0/0/0/1.452
  5      ce2                     Ingress  0015.0000.8830 [Ok]  FDB
      pe2                    Gi0/1/0/0
Replies dropped: 0

```

Table 34: show ethernet cfm traceroute-cache Field Descriptions

Field	Description
Traceroute at	Date and time the traceroute was started.
to	Destination MAC address.
explore to	(Exploratory traceroutes) MAC address of the target for the exploratory traceroute.
TTL	Initial Time To Live used for the traceroute operation.
Trans ID	Transaction ID
Timeout	(Exploratory traceroutes) If no timeout was configured, "Timeout auto" is shown.
Reply Filter	(Exploratory traceroutes) Type of filter.

Field	Description
automatic	Indicates that the traceroute was triggered automatically (for example, as a result of a peer MEP exceeding the loss threshold, or if Continuity-Check Auto-traceroute is configured).
00:00:00 remaining	If the traceroute is in progress, the time remaining until it completes.
No replies received	Traceroute has completed but no replies were received.
Replies dropped	Number of replies dropped.
FDB only	Indicates FDB-only was configured for a standard traceroute.
Hop	Number of hops between the source MEP and the Maintenance Point that sent the reply. (Exploratory traceroutes) The display is indented by an extra character as the hop increases, so that the tree of responses can be seen.
Hostname/Last	On the first line, the hostname of the Maintenance Point that sent the reply. On the second line, the hostname of the previous Maintenance Point in the path. If either of the hostnames is unknown, the corresponding Egress ID is displayed instead.
Ingr/Egr	(Exploratory traceroutes) Indicates whether the reply is for an ingress or egress interface, but never both.
Ingress MAC/Name	If the reply includes information about the ingress interface, then the first line displays the ingress interface MAC address and the ingress action. The ingress interface name, if known, is displayed on the second line.
Egress MAC/Name	If the reply includes information about the egress interface, then the first line displays the egress interface MAC address and the egress action. The egress interface name, if known, is displayed on the second line.

Field	Description
MAC/Name	(Exploratory traceroutes) The MAC address of the interface from which the reply was sent, and the ingress/egress action, are displayed on the first line. If the interface name was present in the reply, it is displayed on the second line.
Relay	Type of relay action performed. For standard traceroutes, the possible values are: • Hit—The target MAC address was reached. • FDB—The target MAC address was found in the Filtering Database (the MAC learning table on the switch) and will be forwarded by the interface. • MPDB—The target MAC address was found in the MP Database (the CCM Learning database on the switch). In addition, “MEP” is displayed on the second line if a terminal MEP was reached. For exploratory traceroutes, the possible values are: • Hit—The target MAC address was reached. • FDB—The target MAC address was found in the Filtering Database and will be forwarded at this interface. • Flood—The target MAC address was not found in the Filtering database, and will be flooded at this interface. • Drop—The target MAC address will not be forwarded at this interface.

The following example shows sample output for the **show ethernet cfm traceroute-cache detail** command:

```
RP/0/RP0/CPU0:router# show ethernet cfm traceroute-cache domain bar detail

Traceroutes in domain bar (level 4), service bar
Source: MEP-ID 1, interface GigabitEthernet0/0/0/0
=====
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:

Hop Hostname                Ingress MAC                Egress MAC                Relay
-----
 1 ios                      0001.0203.0400 [Down]
   Level: 4, version: 0, Transaction ID: 2
   TTL: 63, Relay Action: RlyFDB
   Forwarded, Terminal MEP not reached
   Last egress ID: 0000-0001.0203.0400
```

show ethernet cfm traceroute-cache

```

Next egress ID: 0000-0001.0203.0400
Ingress interface:
  Action: IngDown, MAC: 0001.0203.0400
  ID: Local: Gi0/0/0/0
Hostname: Local: ios, address Not specified

2 abc                                0001.0203.0401 [Ok]    FDB
Level: 4, version: 0, Transaction ID: 2
TTL: 62, Relay Action: RlyFDB
Forwarded, Terminal MEP not reached
Last egress ID: 0000-0001.0203.0400
Next egress ID: 0000-0001.0203.0401
Egress interface:
  Action: EgOk, MAC: 0001.0203.0401
  ID: Not present
Hostname: Local: abc, address Not specified

3 bcd                                0001.0203.0402 [Ok]    Hit
Level: 4, version: 0, Transaction ID: 2
TTL: 61, Relay Action: RlyHit
Not Forwarded, Terminal MEP not reached
Last egress ID: 0000-0001.0203.0401
Next egress ID: Not Forwarded
Ingress interface:
  Action: IngOk, MAC: 0001.0203.0402
  ID: Local: GigE0/0
Hostname: Local: bcd, address Not specified

Replies dropped: 0

```

Traceroute at 2009-05-18 12:30:10 explore to ffff.ffff.ffff from 0204.0608.0a0c, TTL 255, Trans ID 5, Timeout auto, Reply Filter Spanning Tree:

Hop	Hostname	Ingr/Egr	MAC	Relay
1	0000-0015.0000.ffff	Ingress	0015.0000.ffff [Ok]	FDB
Level: 2, version: 0, Transaction ID: 5 TTL: 254, Relay Action: RlyFDB Forwarded, Terminal MEP not reached Next-Hop Timeout: 5 seconds Delay Model: Logarithmic Last egress ID: 0000-0002.0002.0002 Next egress ID: 0000-0015.0000.ffff Ingress interface: Action: ELRIngOk, MAC: 0015.0000.ffff ID: Local: Gi0/0/0/0.1				
2	0001-0030.0000.ffff	Egress	0030.0000.ffff [Ok]	Drop
Level: 2, version: 0, Transaction ID: 5 TTL: 253, Relay Action: RlyDrop Not Forwarded, Terminal MEP not reached Next-Hop Timeout: 5 seconds Delay Model: Logarithmic Last egress ID: 0000-0015.0000.ffff Next egress ID: 0030-0000.0000.ffff Egress interface: Action: ELREgrOk, MAC: 0030.0000.ffff ID: Local: Gi0/1/0/1.2				

Related Commands

Command	Description
traceroute cache, on page 607	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
clear ethernet cfm traceroute-cache, on page 432	Removes the contents of the traceroute cache.

Command	Description
traceroute ethernet cfm, on page 609	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet oam configuration

To display the current active Ethernet OAM configuration on an interface, use the **show ethernet oam configuration** command in EXEC mode.

show ethernet oam configuration [*interface type interface-path-id*]

Syntax Description

interface type	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

If no parameters are specified, the configurations for all Ethernet OAM interfaces is displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The “Uni-directional link-fault detection enabled” output field was added. The “Uni-directional link-fault detection enabled” field is not supported in this release. Therefore, the field will always display “N.”

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command displays the Ethernet OAM configuration information for all interfaces, or a specified interface.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display Ethernet OAM configuration information for a specific interface:

```
RP/0/RP0/CPU0:router# show ethernet oam configuration interface gigabitethernet 0/4/0/0
Thu Aug  5 21:54:34.050 DST
GigabitEthernet0/4/0/0:
  Hello interval:                               1s
  Link monitoring enabled:                       Y
  Remote loopback enabled:                      N
  Mib retrieval enabled:                       N
  Uni-directional link-fault detection enabled:  N
  Configured mode:                             Active
  Connection timeout:                           5
  Symbol period window:                        0
  Symbol period low threshold:                  1
  Symbol period high threshold:                None
  Frame window:                                1000
  Frame low threshold:                         1
  Frame high threshold:                        None
  Frame period window:                         1000
  Frame period low threshold:                   1
  Frame period high threshold:                 None
  Frame seconds window:                        60000
  Frame seconds low threshold:                  1
  Frame seconds high threshold:                None
  High threshold action:                       None
  Link fault action:                           Log
  Dying gasp action:                           Log
  Critical event action:                       Log
  Discovery timeout action:                     Log
  Capabilities conflict action:                 Log
  Wiring conflict action:                      Error-Disable
  Session up action:                           Log
  Session down action:                         Log
  Remote loopback action:                      Log
  Require remote mode:                         Ignore
  Require remote MIB retrieval:                 N
  Require remote loopback support:              N
  Require remote link monitoring:               N
```

The following example shows how to display the configuration for all EOAM interfaces:

```
RP/0/RP0/CPU0:router# show ethernet oam configuration
Thu Aug  5 22:07:06.870 DST
GigabitEthernet0/4/0/0:
  Hello interval:                               1s
  Link monitoring enabled:                       Y
  Remote loopback enabled:                      N
  Mib retrieval enabled:                       N
  Uni-directional link-fault detection enabled:  N
  Configured mode:                             Active
  Connection timeout:                           5
  Symbol period window:                        0
  Symbol period low threshold:                  1
  Symbol period high threshold:                None
  Frame window:                                1000
  Frame low threshold:                         1
  Frame high threshold:                        None
  Frame period window:                         1000
  Frame period low threshold:                   1
  Frame period high threshold:                 None
  Frame seconds window:                        60000
  Frame seconds low threshold:                  1
  Frame seconds high threshold:                None
  High threshold action:                       None
  Link fault action:                           Log
  Dying gasp action:                           Log
  Critical event action:                       Log
  Discovery timeout action:                     Log
```

show ethernet oam configuration

```

Capabilities conflict action:          Log
Wiring conflict action:              Error-Disable
Session up action:                   Log
Session down action:                 Log
Remote loopback action:              Log
Require remote mode:                 Ignore
Require remote MIB retrieval:        N
Require remote loopback support:     N
Require remote link monitoring:      N

```

Related Commands

Command	Description
show ethernet oam discovery, on page 579	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam statistics, on page 585	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 582	

show ethernet oam discovery

To display the currently configured OAM information of Ethernet OAM sessions on interfaces, use the **show ethernet oam discovery** command in EXEC mode.

show ethernet oam discovery [**brief**] **interface** *type interface-path-id* [**remote**]

Syntax Description

brief	Displays minimal, currently configured OAM information in table form.
interface <i>type</i>	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
remote	(Optional) Retrieves and displays information from a remote device, as if the command was run on the remote device.

Command Default

Displays detailed information for Ethernet OAM sessions on all interfaces.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display the minimal, currently configured OAM information for Ethernet OAM sessions on all interfaces:

```
RP/0/RP0/CPU0:router# show ethernet oam discovery brief
```

```
Sat Jul  4 13:52:42.949 PST
Flags:
  L - Link Monitoring support
  M - MIB Retrieval support
  R - Remote Loopback support
  U - Unidirectional detection support
  * - data is unavailable

Local          Remote          Remote
Interface      MAC Address    Vendor Mode    Capability
-----
Gi0/1/5/1      0010.94fd.2bfa 00000A Active  L
Gi0/1/5/2      0020.95fd.3bfa 00000B Active  M
Gi0/1/6/1      0030.96fd.6bfa 00000C Passive L R
Fa0/1/3/1      0080.09ff.e4a0 00000C Active  L R
```

The following example shows how to display detailed, currently configured OAM information for the Ethernet OAM session on a specific interface:

```
RP/0/RP0/CPU0:router# show ethernet oam discovery interface gigabitethernet 0/1/5/1
```

```
Sat Jul  4 13:56:49.967 PST
GigabitEthernet0/1/5/1:
Local client
-----
Administrative configuration:
  PDU revision:                1
  Mode:                        Active
  Unidirectional support:      N
  Link monitor support:        Y
  Remote loopback support:     N
  MIB retrieval support:       N
  Maximum PDU size:            1500
  Mis-wiring detection key:     5E9D

Operational status:
  Port status:                 Active send
  Loopback status:             None
  Interface mis-wired:         N

Remote client
-----
MAC address:                   0030.96fd.6bfa
Vendor (OUI):                  00.00.0C (Cisco)

Administrative configuration:
  PDU revision:                5
  Mode:                        Passive
  Unidirectional support:      N
  Link monitor support:        Y
  Remote loopback support:     Y
  MIB retrieval support:       N
  Maximum PDU size:            1500
```

Related Commands

Command	Description
show ethernet oam configuration , on page 576	Displays the current active Ethernet OAM configuration on an interface.

Command	Description
show ethernet oam statistics, on page 585	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 582	

show ethernet oam interfaces

To display the current state of Ethernet OAM interfaces, use the **show ethernet oam interfaces** command in EXEC mode.

show ethernet oam interfaces [*interface type interface-path-id*]

Syntax Description

interface type	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No parameters displays the current state for all Ethernet OAM interfaces.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display the current state for all Ethernet OAM interfaces:

```
RP/0/RP0/CPU0:router# show ethernet oam interfaces
GigabitEthernet0/0/0/0
In REMOTE_OK state
Local MWD key: 80081234
Remote MWD key: 8F08ABCC
```

EFD triggered: Yes (link-fault)

Table 35: show ethernet oam interfaces Field Descriptions

Field	Description
In <i>type</i> state	The possible discovery state <i>type</i> values are: • ACTIVE_SEND_LOCAL—The interface is configured in active mode (the default), but no Information PDUs have been received from the peer (except possibly link-fault PDUs). Information PDUs are sent. • FAULT—A local unidirectional link fault has been detected. Link-fault PDUs are sent. • INACTIVE—The interface is down. • PASSIVE_WAIT—The interface is configured in passive mode (mode passive command) but no Information PDUs have been received from the peer (except possibly link-fault PDUs). No PDUs are sent. • REMOTE—(Also known as SEND_LOCAL_REMOTE). Information PDUs are being sent and received, but the local device is not satisfied with the remote peer's capabilities (for example, because there is a 'require-remote' configuration and the peer does not have the required capabilities). • REMOTE_OK—(Also known as SEND_LOCAL_REMOTE_OK). Information PDUs are being sent and received, and the local device is satisfied with the peer's capabilities, but the remote peer is not satisfied with the local device capabilities (for example, because there is a 'require-remote' configuration on the peer device). • SEND_ANY—The discovery process has completed, both devices are satisfied with the configuration and the session is up. All types of PDU can be sent and received.

Field	Description
EFD triggered	Indicates if an Ethernet Fault Detection (EFD) event has occurred on the interface and the type of fault that triggered the interface to be moved to the down state for the line protocol. The possible EFD trigger events are: • capabilities-conflict • discovery-timeout • link-fault • session-down • wiring-conflict

Related Commands

Command	Description
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 579	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam statistics, on page 585	Displays the local and remote Ethernet OAM statistics for interfaces.

show ethernet oam statistics

To display the local and remote Ethernet OAM statistics for interfaces, use the **show ethernet oam statistics** command in EXEC mode.

show ethernet oam statistics [*interface type interface-path-id*] [**remote**]

Syntax Description

interface type	(Optional) Displays information about the specified interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
remote	(Optional) Retrieves and displays information from a remote device, as if the command was run on the remote device.

Command Default

No parameters displays statistics for all Ethernet OAM interfaces.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display Ethernet OAM statistics for a specific interface:

```
RP/0/RP0/CPU0:router# show ethernet oam statistics interface gigabitethernet 0/1/5/1
```

show ethernet oam statistics

```

Sat Jul  4 14:34:52.320 PST
GigabitEthernet0/1/5/1:
Counters
-----
    Information OAMPDU Tx           161177
    Information OAMPDU Rx           151178
    Unique Event Notification OAMPDU Tx      0
    Unique Event Notification OAMPDU Rx      0
    Duplicate Event Notification OAMPDU Tx    0
    Duplicate Event Notification OAMPDU Rx    0
    Loopback Control OAMPDU Tx              0
    Loopback Control OAMPDU Rx              0
    Variable Request OAMPDU Tx              0
    Variable Request OAMPDU Rx              0
    Variable Response OAMPDU Tx             0
    Variable Response OAMPDU Rx             0
    Organization Specific OAMPDU Tx          0
    Organization Specific OAMPDU Rx          0
    Unsupported OAMPDU Tx                  45
    Unsupported OAMPDU Rx                  0
    Frames Lost due to OAM                  23
    Fixed frames Rx                         1

Local event logs
-----
    Errored Symbol Period records          0
    Errored Frame records                   0
    Errored Frame Period records            0
    Errored Frame Second records            0

Remote event logs
-----
    Errored Symbol Period records          0
    Errored Frame records                   0
    Errored Frame Period records            0
    Errored Frame Second records            0

```

Related Commands

Command	Description
show ethernet oam configuration, on page 576	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 579	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam interfaces, on page 582	

show ethernet sla configuration-errors

To display information about errors that are preventing configured Ethernet Service Level Agreement (SLA) operations from becoming active, as well as any warnings that have occurred, use the **show ethernet sla configuration-errors** command in EXEC mode.

show ethernet sla configuration-errors [**domain** *domain-name*] [**interface** *type interface-path-id*] [**profile** *profile-name*]

Syntax Description

domain <i>domain-name</i>	Displays information for the specified domain, where <i>domain-name</i> is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface <i>type</i>	(Optional) Displays information for the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
profile <i>profile-name</i>	(Optional) Displays information for the specified profile name.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display information about errors that are preventing configured SLA operations from becoming active:

```
RP/0/RP0/CPU0:router# show ethernet sla configuration-errors
```

```
Errors:
```

```
-----
```

```
Profile 'gold' is not defined but is used on Gi0/0/0/0.0
```

```
Profile 'red' defines a test-pattern, which is not supported by the type
```


show ethernet sla operations

To display information about configured Ethernet Service Level Agreement (SLA) operations, use the **show ethernet sla operations** command in EXEC mode.

show ethernet sla operations [**detail**] [**domain** *domain-name*] [**interface** *type interface-path-id*] [**on-demand** {**all** | *id*} | **profile** {*profile-name* | **all**}]

Syntax Description

detail	(Optional) Displays detailed information.
domain <i>domain-name</i>	(Optional) Displays information for the specified domain, where <i>domain-name</i> is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface <i>type</i>	(Optional) Displays information for the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Displays information for the specified interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
on-demand all	(Optional) Displays information for all on-demand operations.
on-demand <i>id</i>	(Optional) Displays information for the specified on-demand operation, where <i>id</i> is the number of the operation.
profile <i>profile-name</i>	(Optional) Displays information for the specified profile name.
profile all	(Optional) Displays information for all profiles.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display information about configured SLA operations in brief:

```
RP/0/RP0/CPU0:router# show ethernet sla operations
```

```

Profile          Instance
-----
business-gold    Gi0/0/0/0, dom mydom, to 00ab.cdef.1234
business-gold    Gi0/0/0/0, dom mydom, to MEP-ID 2

```

The following example shows how to display information about configured SLA operations in detail:

```
RP/0/RP0/CPU0:router# show ethernet sla operations detail
```

```

Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MAC Address 00ab.cdef.1234
=====
Profile 'business-gold'
Probe type 'cfm-delay-measurement':
    burst sent every 1min, each of 20 packets sent every 100ms
Measures RT Delay: 5 bins; 1 buckets/probe; 75 of 100 archived
Measures RT Jitter (interval 1): no aggregation; 5 probes/bucket; 10 of 10 archived
Scheduled to run every 5min first at 00:02:00 UTC for 2min (2 bursts)
    last run at 07:32:00 PST Tue 19 January 2010

Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MEP-ID 2
=====
Profile 'business-gold'
Probe type 'cfm-delay-measurement':
    burst sent every 1min, each of 20 packets sent every 100ms
Measures RT Delay: 5 bins; 1 buckets/probe; 75 of 100 archived
Measures RT Jitter (interval 1): no aggregation; 5 probes/bucket; 10 of 10 archived
Scheduled to run every 5min first at 00:02:00 UTC for 2min (2 bursts)
    last run at 07:32:00 PST Tue 19 January 2010

```

The following example shows how to display information about on-demand SLA operations in detail:

```
RP/0/RP0/CPU0:router# show ethernet sla operations detail on-demand
```

```

Source: Interface GigabitEthernet0/0/0/0.0, Domain mydom
Destination: Target MAC Address 00ab.cdef.1234
=====
On-demand operation ID #6
Probe type 'cfm-loopback':
    burst sent every 10s, each of 10 packets sent every 1s
    packets padded to 1024 bytes with pattern 0xabcd56ef
    packets use priority value of 3
Measures RT Delay: no aggregation; 1 buckets/probe; 1 of 100 archived
Started at 12:01:49 GMT Tue 02 March 2010, runs every 1hr for 1hr (360 bursts)
    repeats 10 times, ends at 22:01:49 GMT Tue 02 March 2010

```

The following example shows how to display information about configured and on-demand SLA operations on a specific interface:

```
RP/0/RP0/CPU0:router# show ethernet sla operations interface gigabitethernet 0/0/0/0.0
detail
```

```
Interface GigabitEthernet 0/0/0/0.0
Domain mydom Service myser to 00AB.CDEF.1234
-----
Profile 'business-gold'
Probe type CFM-delay-measurement:
    bursts sent every 1min, each of 20 packets sent every 100ms
    packets padded to 1500 bytes with zeroes
    packets use priority value of 7
Measures RTT: 5 bins 20ms wide; 2 buckets/ probe; 75/100 archived
Measures Jitter (interval 1): 3 bins 40ms wide; 2 buckets/probe; 50 archived
Scheduled to run every Sunday at 4am for 2 hours:
    last run at 04:00 25/05/2008
```

show ethernet sla statistics

To display the contents of buckets containing Ethernet Service Level Agreement (SLA) metrics collected by probes, use the **show ethernet sla statistics** command in EXEC mode.

show ethernet sla statistics [**current**|**history**] [**detail**] [**domain** *domain-name*] [**interface type** *interface-path-id*] [**on-demand** {**all**|*id*}|**profile** {*profile-name*|**all**}] [**statistic** *stat-type*]

Syntax Description

current	(Optional) Displays the content of buckets currently being filled.
history	(Optional) Displays the content of all full buckets.
detail	(Optional) Displays detailed content of buckets.
domain <i>domain-name</i>	(Optional) Displays the content of buckets for the specified domain, where <i>domain-name</i> is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface type	(Optional) Displays the content of buckets for the specified interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Displays the content of buckets for the specified interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
on-demand all	(Optional) Displays the content of buckets for all on-demand operations.
on-demand <i>id</i>	(Optional) Displays the content of buckets for the specified on-demand operation, where <i>id</i> is the number of the operation.
profile <i>profile-name</i>	(Optional) Displays the content of buckets for the specified profile name.
profile all	(Optional) Displays the content of buckets for all profiles.
statistic <i>stat-type</i>	(Optional) Displays only the specified type of statistic. Valid values are: • one-way-delay-ds—Displays only one-way (destination-to-source) delay. • one-way-delay-sd—Displays only one-way (source-to-destination) delay. • one-way-jitter-ds—Displays only one-way (destination-to-source) jitter. • one-way-jitter-sd—Displays only one-way (source-to-destination) jitter. • round-trip-delay—Displays only round-trip delay. • round-trip-jitter—Displays only round-trip jitter.

Command Default No default behavior or values

Command Modes EXEC (#)

Command History	Release	Modification
	Release 4.0.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

See the Usage Guidelines in the **buckets size** command for a description of buckets.

Task ID	Task ID	Operations
	ethernet-services	read, write

Examples This example shows how to display the current contents of buckets containing SLA metrics collected by probes in brief:

```
RP/0/RP0/CPU0:router# show ethernet sla statistics

Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MEP-ID 2
=====
Profile 'business-gold', packet type 'cfm-delay-measurement'
Scheduled to run every 5min first at 00:02:00 UTC for 2min

Round Trip Delay
~~~~~
1 buckets per probe

Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
  Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
  Min: 0.24ms; Max: 0.49ms; Mean: 0.34ms; StdDev: 0.05ms

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
  Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
  Min: 0.24ms; Max: 0.69ms; Mean: 0.34ms; StdDev: 0.12ms

Round Trip Jitter
~~~~~
1 buckets per probe

Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
  Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
  Min: -0.25ms; Max: 0.13ms; Mean: -0.01ms; StdDev: 0.08ms

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
```

```
Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
Min: -0.38ms; Max: 0.38ms; Mean: -0.02ms; StdDev: 0.14ms
```

This example shows how to display the current contents of buckets containing SLA metrics collected by probes in detail:

**Note**

In this example, the round-trip-delay measurement is configured with aggregation (and hence bins are displayed), whereas the round-trip-jitter measurement is configured with no aggregation (and hence individual samples are displayed).

```
RP/0/RP0/CPU0:router# show ethernet sla statistics detail
Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MEP-ID 2
=====
Profile 'business-gold', packet type 'cfm-delay-measurement'
Scheduled to run every 5min first at 00:02:00 UTC for 2min

Round Trip Delay
~~~~~
1 buckets per probe

Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
  Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
  Min: 0.24ms, occurred at 07:47:29 on Tue 19 Jan 2010 UTC
  Max: 0.49ms, occurred at 07:48:04 on Tue 19 Jan 2010 UTC
  Mean: 0.34ms; StdDev: 0.05ms

  Bins:
  Range      Samples    Cum. Count    Mean
  -----
    0 to 20 ms 20 (100.0%) 20 (100.0%) 0.34ms
    20 to 40 ms 0  (0.0%) 20 (100.0%) -
    40 to 60 ms 0  (0.0%) 20 (100.0%) -
    60 to 80 ms 0  (0.0%) 20 (100.0%) -
    > 80      ms 0  (0.0%) 20 (100.0%) -

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
  Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
  Min: 0.24ms, occurred at 07:53:10 on Tue 19 Jan 2010 UTC
  Max: 0.69ms, occurred at 07:53:42 on Tue 19 Jan 2010 UTC
  Mean: 0.34ms; StdDev: 0.12ms

  Bins:
  Range      Samples    Cum. Count    Mean
  -----
    0 to 20 ms 20 (100.0%) 20 (100.0%) 0.34ms
    20 to 40 ms 0  (0.0%) 20 (100.0%) -
    40 to 60 ms 0  (0.0%) 20 (100.0%) -
    60 to 80 ms 0  (0.0%) 20 (100.0%) -
    > 80      ms 0  (0.0%) 20 (100.0%) -

Round Trip Jitter
~~~~~
1 buckets per probe

Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
  Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
  Min: -0.25ms, occurred at 07:47:53 on Tue 19 Jan 2010 UTC
  Max: 0.13ms, occurred at 07:48:11 on Tue 19 Jan 2010 UTC
  Mean: -0.01ms; StdDev: 0.08ms

  Samples:
  Time sent  Result  Notes
  -----
    07:47:00.0    ...
    07:47:00.1 -0.12ms
```

```

07:47:00.2 0.06ms
07:47:00.3 0.00ms
07:47:00.4 -0.06ms
07:47:00.5 0.00ms
07:47:00.6 0.00ms
07:47:00.7 0.00ms
07:47:00.8 0.06ms
07:47:00.9 0.00ms
07:48:00.0 0.11ms
07:48:00.1 -0.25ms
07:48:00.2 0.13ms
07:48:00.3 0.00ms
07:48:00.4 -0.06ms
07:48:00.5 0.00ms
07:48:00.6 0.06ms
07:48:00.7 -0.06ms
07:48:00.8 0.00ms
07:48:00.9 0.00ms

```

```

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
Min: -0.38ms, occurred at 07:52:13 on Tue 19 Jan 2010 UTC
Max: 0.38ms, occurred at 07:53:26 on Tue 19 Jan 2010 UTC
Mean: -0.02ms; StdDev: 0.14ms

```

```

Samples:
Time sent      Result      Notes
-----
07:52:00.0    ...
07:52:00.1   -0.38ms
07:52:00.2    0.00ms
07:52:00.3   -0.05ms
07:52:00.4    0.00ms
07:52:00.5    0.05ms
07:52:00.6    0.00ms
07:52:00.7    0.00ms
07:52:00.8    0.00ms
07:52:00.9    0.00ms
07:53:00.0    0.38ms
07:53:00.1   -0.32ms
07:53:00.2    0.00ms
07:53:00.3   -0.13ms
07:53:00.4    0.06ms
07:53:00.5    0.00ms
07:53:00.6    0.00ms
07:53:00.7    0.00ms
07:53:00.8    0.06ms
07:53:00.9    0.00ms

```

This example shows how to display the current contents of buckets containing SLA metrics collected by probes on a specific interface:

```
RP/0/RP0/CPU0:router# show ethernet sla statistics current interface GigabitEthernet 0/0/0/0.0
```

```

Interface GigabitEthernet 0/0/0/0.0
Domain mydom Service myser to 00AB.CDEF.1234
=====
Profile 'business-gold', packet type 'cfm-superpacket'
Scheduled to run every Sunday at 4am for 2 hours

Round Trip Delay
~~~~~
2 buckets per probe

Bucket started at 04:00 Sun 17 Feb 2008 lasting 1 hour:
Pkts sent: 2342; Lost 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
Min: 13ms; Max: 154ms; Mean: 28ms; StdDev: 11ms

Round Trip Jitter
~~~~~

```

2 buckets per probe

Bucket started at 04:00 Sun 17 Feb 2008 lasting 1 hour:
 Pkts sent: 2342; Lost: 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
 Min: -5ms; Max: 8ms; Mean: 0ms; StdDev: 3.6ms

This example shows how to display a history detail of buckets containing SLA metrics collected by probes on a specific interface:

RP/0/RP0/CPU0:router# **show ethernet sla history detail GigabitEthernet 0/0/0/0.0**

```
Interface GigabitEthernet 0/0/0/0.0
Domain mydom Service myser to 00AB.CDEF.1234
=====
Profile 'business-gold', packet type 'cfm-loopback'
Scheduled to run every Sunday at 4am for 2 hours

Round Trip Delay
~~~~~
2 buckets per probe

Bucket started at 04:00 Sun 17 Feb 2008 lasting 1 hour:
  Pkts sent: 2342; Lost: 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
  Min: 13ms, occurred at 04:43:29 on Sun 22 Aug 2010 UTC
  Max: 154ms, occurred at 05:10:32 on Sun 22 Aug 2010 UTC
  Mean: 28ms; StdDev: 11ms

Results suspect as more than 10 seconds time drift detected
Results suspect as scheduling latency prevented some packets being sent

Samples:
Time sent      Result  Notes
-----
04:00:01.324    23ms
04:00:01.425    36ms
04:00:01.525    -    Timed Out
...
```

Round Trip Jitter
 ~~~~~  
 2 buckets per probe

```
Bucket started at 04:00 Sun 17 Feb 2008, lasting 1 hour:
  Pkts sent: 2342; Lost: 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
  Min: -5ms, occurred at 04:15:03 on Sun 22 Aug 2010 UTC
  Max: 10ms, occurred at 05:29:15 on Sun 22 Aug 2010 UTC
  Mean: 0ms; StdDev: 3.6ms

Samples:
Time sent      Result  Notes
-----
04:00:01.324    -
04:00:01.425    13ms
04:00:01.525    -    Timed out
...
```

This example shows how to display statistics for all full buckets for on-demand operations in detail:

RP/0/RP0/CPU0:router# **show ethernet sla statistics history detail on-demand**

```
Interface GigabitEthernet0/0/0/0.1
Domain mydom Service myser to 0123.4567.890A
=====
On-demand operation ID #1, packet type 'cfm-delay-measurement'
Started at 15:38 on 06 July 2010 UTC, runs every 1 hour for 1 hour

Round Trip Delay
~~~~~
1 bucket per probe
```



Bucket started at 15:38 on Tue 06 Jul 2010 UTC, lasting 1 hour:  
 Pkts sent: 1200; Lost: 4 (0%); Corrupt: 600 (50%); Misordered: 0 (0%)  
 Min: 13ms, occurred at 15:43:29 on Tue 06 Jul 2010 UTC  
 Max: 154ms, occurred at 16:15:34 on Tue 06 Jul 2010 UTC  
 Mean: 28ms; StdDev: 11ms

| Bins:<br>Range | Samples   | Cum. Count | Mean |
|----------------|-----------|------------|------|
| 0 - 20 ms      | 194 (16%) | 194 (16%)  | 17ms |
| 20 - 40 ms     | 735 (61%) | 929 (77%)  | 27ms |
| 40 - 60 ms     | 212 (18%) | 1141 (95%) | 45ms |
| > 60 ms        | 55 (5%)   | 1196       | 70ms |

Bucket started at 16:38 on Tue 01 Jul 2008 UTC, lasting 1 hour:  
 Pkts sent: 3600; Lost: 12 (0%); Corrupt: 1800 (50%); Misordered: 0 (0%)  
 Min: 19ms, occurred at 17:04:08 on Tue 06 Jul 2010 UTC  
 Max: 70ms, occurred at 16:38:00 on Tue 06 Jul 2010 UTC  
 Mean: 28ms; StdDev: 11ms

| Bins:<br>Range | Samples   | Cum. Count | Mean |
|----------------|-----------|------------|------|
| 0 - 20 ms      | 194 (16%) | 194 (16%)  | 19ms |
| 20 - 40 ms     | 735 (61%) | 929 (77%)  | 27ms |
| 40 - 60 ms     | 212 (18%) | 1141 (95%) | 45ms |
| > 60 ms        | 55 (5%)   | 1196       | 64ms |

## Related Commands

| Command                                   | Description                                                           |
|-------------------------------------------|-----------------------------------------------------------------------|
| <a href="#">buckets size, on page 423</a> | Configures the size of the buckets in which statistics are collected. |

# sla operation

To create an operation instance from a maintenance end point (MEP) to a specified destination, use the **sla operation** command in interface CFM MEP configuration mode. To remove the operation, use the **no** form of this command.

**sla operation profile** *profile-name* **target** {**mep-id** *id*| **mac-address** *mac-address*}

**no sla operation profile** *profile-name* **target** {**mep-id** *id*| **mac-address** *mac-address*}

## Syntax Description

|                                       |                                                                            |
|---------------------------------------|----------------------------------------------------------------------------|
| <b>profile</b> <i>profile-name</i>    | Name of the profile to assign this operation.                              |
| <b>target mep-id</b> <i>id</i>        | Destination MEP ID. The range is 1 to 8191.                                |
| <b>mac-address</b> <i>mac-address</i> | Destination MAC address in standard hexadecimal format, hh:hh:hh:hh:hh:hh. |

## Command Default

No operations are configured

## Command Modes

Interface CFM MEP configuration (config-if-cfm-mep)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **sla operation** command is supported on all Ethernet interfaces.

Multiple SLA operation instances may be configured under each MEP, and may have different targets, and may be assigned to different profiles.

If an operation is assigned to a nonexistent profile, a warning message is issued, and the offending configuration is shown in the output of the related show commands.

Changing the configuration of an SLA operation is equivalent to deleting the operation and creating a new operation. All stored data for the operation is discarded.

When **target mep-id** is specified, the operation is activated only if that MEP is in the peer MEP database. You can verify that a MEP is in the database, using the **show ethernet cfm peer meps** command.

**Task ID**

| Task ID           | Operations  |
|-------------------|-------------|
| ethernet-services | read, write |

**Examples**

The following example shows how to create an SLA operation instance using a profile named “Profile\_1” to a destination MEP with the specified MAC address:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
RP/0/RP0/CPU0:router(config-if-cfm-mep)# sla operation profile Profile_1 target mac-address
01:23:45:67:89:ab
```

**Related Commands**

| Command                                                  | Description                                                             |
|----------------------------------------------------------|-------------------------------------------------------------------------|
| <a href="#">show ethernet cfm peer meps, on page 562</a> | Displays information about maintenance end points (MEPs) for peer MEPs. |

## snmp-server traps ethernet cfm

To enable SNMP traps for Ethernet Connectivity Fault Management (CFM), use the **snmp-server traps ethernet cfm** command in global configuration mode.

**snmp-server traps ethernet cfm**

**Syntax Description** This command has no keywords or arguments.

**Command Default** Ethernet OAM event traps are not enabled.

**Command Modes** Global configuration (config)

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.9.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | snmp    | read, write |

**Examples** The following example shows how to enable SNMP server traps on an Ethernet OAM interface.

```
RP/0/RP0/CPU0:router #configure
RP/0/RP0/CPU0:router(config) # snmp-server traps ethernet cfm
```

## snmp-server traps ethernet oam events

To enable SNMP traps for Ethernet OAM events, use the **snmp-server traps ethernet oam events** command in global configuration mode.

**snmp-server traps ethernet oam events**

**Syntax Description** This command has no keywords or arguments.

**Command Default** Ethernet OAM event traps are not enabled.

**Command Modes** Global configuration (config)

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.9.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | snmp    | read, write |

**Examples** The following example shows how to enable SNMP server traps on an Ethernet OAM interface.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# snmp-server traps ethernet oam events
```

## statistics measure

To enable the collection of Ethernet Service Level Agreement (SLA) statistics, and enter the SLA profile statistics configuration mode, use the **statistics measure** command in SLA profile configuration mode. To disable statistics collection, use the **no** form of this command.

**statistics measure** {**one-way-delay-ds**| **one-way-delay-sd**| **one-way-jitter-ds**| **one-way-jitter-sd**| **round-trip-delay**| **round-trip-jitter**}

**no statistics measure** {**one-way-delay-ds**| **one-way-delay-sd**| **one-way-jitter-ds**| **one-way-jitter-sd**| **round-trip-delay**| **round-trip-jitter**}

### Syntax Description

|                          |                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>one-way-delay-ds</b>  | (CFM delay measurement profile type only) Enables the collection of statistics that measure delay in one direction, from destination to source.                           |
| <b>one-way-delay-sd</b>  | (CFM delay measurement profile type only) Enables the collection of statistics that measure delay in one direction, from source to destination.                           |
| <b>one-way-jitter-ds</b> | (CFM delay measurement profile type only) Enables the collection of statistics that measure delay variance in one direction, from destination to source.                  |
| <b>one-way-jitter-sd</b> | (CFM delay measurement profile type only) Enables the collection of statistics that measure delay variance in one direction, from source to destination.                  |
| <b>round-trip-delay</b>  | (CFM delay measurement and CFM loopback profile types only) Enables the collection of statistics that measure the delay in the round trip of a packet.                    |
| <b>round-trip-jitter</b> | (CFM delay measurement and CFM loopback profile types only) Enables the collection of statistics that measure the amount of delay variance in the round trip of a packet. |

### Command Default

No statistics are collected

### Command Modes

SLA profile configuration (config-sla-prof)

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For statistics to be collected, at least one statistics entry must be present in each profile. To measure more than one type of statistic, this command may be configured more than once in a single profile.

The one-way delay and jitter statistics are available for CFM delay measurement profile types only (**profile (SLA)** command with the **type cfm-delay-measurement** keywords).

#### Task ID

| Task ID           | Operations  |
|-------------------|-------------|
| ethernet-services | read, write |

#### Examples

This example shows how to enable the collection of round-trip-delay statistics, and enter the SLA profile statistics configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RP0/CPU0:router(config-sla-prof-stat-cfg)#
```

#### Related Commands

| Command                                     | Description                                                                    |
|---------------------------------------------|--------------------------------------------------------------------------------|
| <a href="#">ethernet sla</a> , on page 469  | Enters the Ethernet SLA configuration mode.                                    |
| <a href="#">profile (SLA)</a> , on page 528 | Creates an SLA operation profile and enter the SLA profile configuration mode. |

# symbol-period threshold

To configure the thresholds that trigger an Ethernet OAM symbol-period error event, use the **symbol-period threshold** command in Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

**symbol-period threshold low threshold** [**high t hreshold**]

**no symbol-period threshold low threshold** [**high t hreshold**]

## Syntax Description

|                       |                                                                                                                                                                                                                  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>low threshold</b>  | Low threshold value, in symbols, that triggers a symbol-period error event. The range is 0 to 60000000.                                                                                                          |
| <b>high threshold</b> | (Optional) High threshold value, in symbols, that triggers a symbol-period error event. The range is 0 to 60000000. The high threshold value can be configured only in conjunction with the low threshold value. |

## Command Default

The default low threshold is 1.

## Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)  
Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When the low threshold is passed, a symbol-period error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

## Task ID

| Task ID           | Operations  |
|-------------------|-------------|
| ethernet-services | read, write |



## Examples

The following example shows how to configure the symbol-period low and high thresholds that trigger a symbol-period error event:

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)# symbol-period threshold low 100 high 6000
```

# symbol-period window

To configure the window size for an Ethernet OAM symbol-period error event, use the **symbol-period window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

**symbol-period window** *window*

**no symbol-period window** *window*

## Syntax Description

|               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| <i>window</i> | Size of the window for symbol-period error in milliseconds. The range is 1000 to 60000. |
|---------------|-----------------------------------------------------------------------------------------|

## Command Default

The default value is 1000.

## Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)  
Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID           | Operations  |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

The following example shows how to configure the window size for a symbol-period error.

```
RP/0/RP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0/CPU0:router(config-eoam-lm)# symbol-period window 60000
```

# traceroute cache

To set the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries, use the **traceroute cache** command in CFM configuration mode. To return the traceroute cache to its default limits, use the **no** form of this command.

**traceroute cache hold-time** *minutes* **size** *entries*

**no traceroute cache hold-time** *minutes* **size** *entries*

## Syntax Description

|                                 |                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>hold-time</b> <i>minutes</i> | Timeout value in minutes that entries are held in the Ethernet CFM traceroute cache table before being cleared. Range is 1 minute or greater.    |
| <b>size</b> <i>entries</i>      | Maximum number of entries that are stored in the Ethernet CFM traceroute cache table. An entry is a single traceroute reply. Range is 1 to 5000. |

## Command Default

**hold-time:** 100

**size:** 100

## Command Modes

CFM configuration (config-cfm)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

A separate cache is managed for each node that sends a traceroute request. All replies to a single traceroute request are cached at once. The **hold-time** begins when the last reply to a request is received. When the **hold-time** limit is reached, all replies to that request are cleared. The size of each traceroute reply is limited by the MTU of the interface.

When the maximum number of entries (**size** *entries*) is exceeded, all replies for the oldest request are deleted.

## Task ID

| Task ID           | Operations  |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

The following example shows how to set the **hold-time** and the **size** of a tracertoute cache.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# tracertoute cache hold-time 1 size 3000
```

## Related Commands

| Command                                               | Description                                                  |
|-------------------------------------------------------|--------------------------------------------------------------|
| <a href="#">ethernet cfm (global), on page 461</a>    | Enters CFM configuration mode.                               |
| <a href="#">tracertoute ethernet cfm, on page 609</a> | Sends Ethernet CFM tracertoute messages to generate a basic. |

## traceroute ethernet cfm

To send Ethernet connectivity fault management (CFM) traceroute messages to generate a basic, targeted, or exploratory traceroute, use the **traceroute ethernet** command in EXEC mode.

**traceroute ethernet cfm domain** *domain-name* **service** *service-name* {**mac-address** *target-mac-address*|**mep-id** *target-mep-id*|**explore** [**all-ports**] [**from** *from-mac-address*]} **source** [**mep-id** *source-mep-id*] **interface** *type interface-path-id* [**asynchronous**] [**timeout** *seconds*] [**filtering-db-only**] [**cos** *cos-no*] [**ttl** *ttl*] [**detail**]

### Syntax Description

|                                              |                                                                                                                                                                                                                                                                                 |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>domain</b> <i>domain-name</i>             | String of a maximum of 80 characters that identifies the domain in which the destination MEP resides. (Basic traceroute)                                                                                                                                                        |
| <b>service</b> <i>service-name</i>           | String of a maximum of 80 characters that identifies the maintenance association to which the destination MEP belongs. (Basic traceroute)                                                                                                                                       |
| <b>mac-address</b> <i>target-mac-address</i> | Identifies the 6-byte MAC address (in hexadecimal H.H.H format) of the destination MEP. (Targeted traceroute)                                                                                                                                                                   |
| <b>mep-id</b> <i>target-mepid</i>            | Destination maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191. (Targeted traceroute)                                                                                                                                                             |
| <b>explore</b>                               | (Optional) Specifies that an exploratory traceroute is performed.                                                                                                                                                                                                               |
| <b>all-ports</b>                             | (Optional) Specifies an exploratory traceroute of all ports.                                                                                                                                                                                                                    |
| <b>from</b> <i>from-mac-address</i>          | (Optional) Specifies an exploratory traceroute beginning at the specified MAC address (in hexadecimal H.H.H format).                                                                                                                                                            |
| <b>source</b>                                | Specifies source information for the traceroute.                                                                                                                                                                                                                                |
| <b>mep-id</b> <i>source-mep-id</i>           | (Optional) Source maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.                                                                                                                                                                             |
| <b>interface</b> <i>type</i>                 | Source interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                    |
| <i>interface-path-id</i>                     | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>asynchronous</b>                          | (Optional) Specifies that the traceroute is performed asynchronously, where control is returned to the command prompt immediately, and no results are displayed. The results can be displayed later using the <b>show ethernet cfm traceroute-cache</b> command.                |

|                               |                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>timeout</b> <i>seconds</i> | (Optional) Timeout value (in seconds) for the specified interface. For a basic traceroute, the timeout is a fixed value that defaults to 5 seconds. For an exploratory traceroute, a logarithmic algorithm is used unless this value is specified.                                                                                                                                        |
| <b>filtering-db-only</b>      | (Optional) Sets whether or not the remote maintenance points should base their responses on the filtering database only. The default is no—use both the filtering and MIP-CCM databases.<br><br><b>Note</b> The <b>filtering-db-only</b> option is only available for basic traceroute (when the MAC address or MEP ID is specified). It is not available with the <b>explore</b> option. |
| <b>cos</b> <i>cos-no</i>      | (Optional) Identifies the class of traffic of the source MEP by setting a Class of Service (CoS) value. The valid values are from 0 to 7.                                                                                                                                                                                                                                                 |
| <b>tth</b> <i>tth</i>         | Specifies the initial time-to-live (TTL) value (from 1 to 255) for the traceroute message. The default is 64.                                                                                                                                                                                                                                                                             |
| <b>detail</b>                 | (Optional) Specifies that details are displayed in the output for the traceroute.                                                                                                                                                                                                                                                                                                         |

**Command Default**

No default behavior or values

**Command Modes**

EXEC (#)

**Command History**

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

By default, this command pauses until the traceroute operation is complete, then displays the results. If the **asynchronous** option is used, this command returns immediately and no results are displayed. Results are placed in the traceroute cache and can be retrieved using the **show ethernet cfm traceroute-cache** command.

An exploratory traceroute, by default uses a **timeout** value that is calculated by a logarithmic delay algorithm. If the **timeout** value is specified, the specified value is used.

The display output of this command is similar to the output of the **show ethernet cfm traceroute-cache** command.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

**Examples**

The following example shows how generate a basic traceroute:

```
RP/0/RP0/CPU0:router# traceroute ethernet cfm domain bar service bar mep-id 1 source interface gigabitethernet 0/0/0/0
```

```
Traceroutes in domain bar (level 4), service bar
Source: MEP-ID 1, interface GigabitEthernet0/0/0/0
=====
```

```
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:
```

| Hop | Hostname/Last       | Ingress MAC/name      | Egress MAC/Name     | Relay |
|-----|---------------------|-----------------------|---------------------|-------|
| 1   | ios                 | 0001.0203.0400 [Down] |                     | FDB   |
|     | 0000-0001.0203.0400 | Gi0/0/0/0             |                     |       |
| 2   | abc                 |                       | 0001.0203.0401 [Ok] | FDB   |
|     | ios                 |                       | Not present         |       |
| 3   | bcd                 | 0001.0203.0402 [Ok]   |                     | Hit   |
|     | abc                 | GigE0/0               |                     |       |

Replies dropped: 0

**Related Commands**

| Command                                                          | Description                                                                                                        |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <a href="#">traceroute cache, on page 607</a>                    | Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries. |
| <a href="#">clear ethernet cfm traceroute-cache, on page 432</a> | Removes the contents of the traceroute cache.                                                                      |
| <a href="#">show ethernet cfm traceroute-cache, on page 569</a>  | Displays the contents of the traceroute cache.                                                                     |







# Global Interface Commands on the Cisco IOS XR Software

---

This module describes the global command line interface (CLI) commands for configuring interfaces on the Cisco CRS Router.

- [bandwidth \(global\), page 614](#)
- [clear interface, page 616](#)
- [dampening, page 618](#)
- [interface \(global\), page 620](#)
- [mtu, page 622](#)
- [show im dampening, page 625](#)
- [show interfaces, page 629](#)
- [shutdown \(global\), page 640](#)

# bandwidth (global)

To configure the bandwidth of an interface, use the **bandwidth** command in interface configuration mode.

**bandwidth** *rate*

## Syntax Description

|             |                                                                                                                          |
|-------------|--------------------------------------------------------------------------------------------------------------------------|
| <i>rate</i> | Amount of bandwidth to be allocated on the interface, in Kilobits per second (kbps). Range is from 0 through 4294967295. |
|-------------|--------------------------------------------------------------------------------------------------------------------------|

## Command Default

The default bandwidth depends on the interface type.

## Command Modes

Interface configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



### Note

To obtain the default bandwidth for a specific interface, use the **show interfaces** command after you first bring up the interface. The default interface bandwidth is displayed in the **show interfaces** command output.

## Task ID

| Task ID        | Operations  |
|----------------|-------------|
| interface      | execute     |
| basic-services | read, write |

## Examples

The following example shows how to configure the bandwidth on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router# interface GigabitEthernet 0/4/1/0
```

```
RP/0/RP0/CPU0:router# bandwidth 4000000
```

**Related Commands**

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">interface (global), on page 620</a> | Configures an interface or creates or configures a virtual interface.    |
| <a href="#">shutdown (global), on page 640</a>  | Disables an interface (forces an interface to be administratively down). |

# clear interface

To clear interface statistics or packet counters, use the **clear interface** command in EXEC mode.

**clear interface** *type interface-path-id*

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i>              | Interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                           |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

**Task ID**

| Task ID        | Operations  |
|----------------|-------------|
| interface      | execute     |
| basic-services | read, write |

**Examples**

The following example shows how to use the **clear interface** command to clear the loopback interface 2:

```
RP/0/RP0/CPU0:router# clear interface loopback 2
```

**Related Commands**

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">interface (global), on page 620</a> | Configures an interface or creates or configures a virtual interface.    |
| <a href="#">shutdown (global), on page 640</a>  | Disables an interface (forces an interface to be administratively down). |

# dampening

To limit propagation of transient or frequently changing interface states on Interface Manager (IM) clients, turn on event dampening by using the **dampening** command in interface configuration mode. To turn dampening off, use the **no** form of this command.

**dampening** [*half-life* [*reuse suppress max-suppress-time*]]

**no dampening** [*half-life* [*reuse suppress max-suppress-time*]]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>half-life</i>         | (Optional) Time (in minutes) after which a penalty is decreased. Once the interface has been assigned a penalty, the penalty is decreased by half after the half-life period. The process of reducing the penalty happens every 5 seconds. The range of the half-life period is 1 to 45 minutes. The default is 1 minute. |
| <i>reuse</i>             | (Optional) Penalty value below which a stable interface is unsuppressed. Range is from 1 through 20000. Default value is 750.                                                                                                                                                                                             |
| <i>suppress</i>          | (Optional) Limit at which an interface is suppressed when its penalty exceeds that limit. Range is from 1 through 20000, and must be greater than the reuse threshold. The default value is 2000.                                                                                                                         |
| <i>max-suppress-time</i> | (Optional) Maximum time (in minutes) that an interface can be suppressed. This value effectively acts as a ceiling that the penalty value cannot exceed. Default value is four times the half-life period.                                                                                                                |

## Command Default

Dampening is turned off by default. When you use the **dampening** command, the following default values are enabled for any optional parameters that you do not enter:

- *half-life*: 1 minute
- *reuse*: 750
- *suppress*: 2000
- *max-suppress-time*: Four times the half-life

## Command Modes

Interface configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Event dampening suppresses a constantly unstable interface until it remains stable for a period of time. Enabling dampening on an interface that already has dampening configured has the effect of resetting the penalty associated with that interface to zero. The reuse threshold must always be less than the suppress threshold.

Consider the following guidelines when configuring event dampening:

- Configuring dampening on both a subinterface and its parent is usually unnecessary because their states are almost always the same and dampening would be triggered at the same time on each interface.
- If all subinterfaces require dampening, then apply dampening to the main interface only. Applying configuration to large numbers of subinterfaces requires an abundance of memory and increases the time required to process the configuration during boot and failover.
- When dampening is enabled, an interface has a penalty value associated with it. The value starts at 0 and is increased by 1000 whenever the underlying state of the interface changes from up to down.
- The penalty value decreases exponentially while the interface state is stable. If the penalty value exceeds a configured suppress threshold, then the state of the interface is suppressed and IM will not notify upper layers of further state transitions. The suppressed state remains until the penalty value decreases past a configured reuse threshold.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

The following example shows how to enable dampening with default values on an interface:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/4/0/0
RP/0/RP0/CPU0:router(config-if)# dampening
```

**Related Commands**

| Command                                                         | Description                                                                  |
|-----------------------------------------------------------------|------------------------------------------------------------------------------|
| <a href="#">show im dampening</a> , <a href="#">on page 625</a> | Displays the state of all interfaces on which dampening has been configured. |

# interface (global)

To configure an interface or to create or configure a virtual interface, use the **interface** command in global configuration mode. To delete the interface configuration, use the **no** form of this command.

**interface** *type interface-path-id*

**no interface** *type interface-path-id*

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i>              | Interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                           |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No interfaces are configured

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.



The **interface** command enters interface configuration mode to allow you to configure interfaces. If a virtual interface is configured, then the interface is created if it did not already exist.

The **no** form of this command applies only to virtual interfaces or to subinterfaces (that is, interfaces that have been created in global configuration mode).

#### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

#### Examples

In the following example, the **interface** command is given for the POS card in location 0/2/0/1, and interface configuration mode is entered for that interface:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/1
```

#### Related Commands

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">clear interface</a> , on page 616   | Clears interface statistics or packet counters.                          |
| <a href="#">shutdown (global)</a> , on page 640 | Disables an interface (forces an interface to be administratively down). |

## mtu

To adjust the maximum transmission unit (MTU) value for packets on the interface, use the **mtu** command in interface configuration mode. To return the interface to the default MTU for the interface type, use the **no** form of this command.

**mtu** *bytes*

**no mtu**

### Syntax Description

|              |                                                                             |
|--------------|-----------------------------------------------------------------------------|
| <i>bytes</i> | Maximum number of bytes in a Layer 2 frame. Range is from 64 through 65535. |
|--------------|-----------------------------------------------------------------------------|

### Command Default

The default MTU for each interface is as follows:

- Ethernet—1514 bytes
- POS—4474 bytes
- Tunnel—1500 bytes
- Loopback—1514 bytes
- ATM—4470 bytes

### Command Modes

Interface configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **mtu** command to set a specific MTU value for an interface, or use the **no mtu** command to return the interface to the default MTU value for that interface type. The MTU value can be increased or decreased using the **mtu** command, subject to minimum and maximum MTU limits for the interface type.

If the MTU value is not configured, then each interface will have a default MTU value that is specific to the interface type. The default MTU value is generally the largest Layer 2 frame size possible for the interface type.

The default/configured MTU value on an atm interface includes the L2 header.

The MTU size consists of L2 header that includes either SNAP(8bytes)/MUX(0)/NLPID(2) header or the AAL5 SDU. The AAL5 SDU includes the L3 datagram and the optional Logical Link Control/Subnetwork Access Protocol (LLC/SNAP) header.

The Ethernet interface is the Layer 3 datagram plus 14 bytes. For ATM main interface, the MTU is L3 datagram + 0 bytes.

For ATM L3 sub interface, mtu is as follows:

- SNAP - L3 datagram + 8 bytes
- NLPID - L3 datagram + 2 bytes
- MUX - L3datagram + 0 bytes
- When no pvc is configured under sub interface - L3datagram + 0 bytes

**Note**

All serial links in a Multilink Point-to-Point Protocol (MLPPP) bundle or a Multilink Frame Relay (MFR) bundle inherit the default MTU value from the multilink bundle. If a serial interface has a nondefault MTU value, the Cisco IOS XR software blocks that serial interface from being added to an MLPPP or MFR bundle. Therefore, you must not configure the MTU value on a serial interface until you have added that serial interface to an MLPPP or MFR bundle.

You can use the **show interfaces** command to determine if the MTU value has been changed. The **show interfaces** command output displays the MTU size for each interface in the MTU (byte) field.

**Note**

You can use the **show interfaces** command to determine if the MTU value has been changed. The **show interfaces** command output displays the MTU size for each interface in the MTU (byte) field. Note that the MTU size that is displayed includes the Layer 2 header bytes used for each encapsulation type.

**Note**

Changing the MTU on an interface triggers a change on the protocols and capsulations configured on that interface, although some protocol-specific configurations can override the interface MTU. For example, specifically changing the interface MTU configuration does not affect the IP MTU configuration, but may affect the resulting MTU on that node.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

In the following example, the MTU value for all interfaces is verified. The MTU value is shown in the next-to-last column:

```
RP/0/RP0/CPU0:router# show interfaces all brief
```

|              |               |                |               |               |              |
|--------------|---------------|----------------|---------------|---------------|--------------|
| Intf<br>Name | Intf<br>State | LineP<br>State | Encap<br>Type | MTU<br>(byte) | BW<br>(Kbps) |
|--------------|---------------|----------------|---------------|---------------|--------------|

```

 Nu0 up up Null 1500 Unknown
 PO6/0/0/0 up up HDLC 4474 2488320
 PO6/0/0/1 up up HDLC 4474 2488320
 PO6/0/0/2 admin-down admin-down HDLC 4474 2488320
 PO6/0/0/3 admin-down admin-down HDLC 4474 2488320
 Mg0/RP0/CPU0/0 up up ARPA 1514 100000

```

```

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 6/0/0/0
RP/0/RP0/CPU0:router(config-if)# mtu 1000

```

After the **mtu** command is used to decrease the MTU Layer 2 frame size for the POS interface on 6/0/0/0 to 1000 bytes, the **show interfaces all brief** command is used again to verify that the MTU Layer 2 frame size has been changed:

```
RP/0/RP0/CPU0:router# show interfaces all brief
```

```

 Intf Intf LineP Encap MTU BW
 Name State State Type (byte) (Kbps)

 Nu0 up up Null 1500 Unknown
 PO6/0/0/0 up up HDLC 1000 2488320
 PO6/0/0/1 up up HDLC 4474 2488320
 PO6/0/0/2 admin-down admin-down HDLC 4474 2488320
 PO6/0/0/3 admin-down admin-down HDLC 4474 2488320
 Mg0/RP0/CPU0/0 up up ARPA 1514 100000

```

## Related Commands

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">shutdown (global)</a> , on page 640 | Disables an interface (forces an interface to be administratively down). |

# show im dampening

To display the state of all interfaces on which dampening has been configured, use the **show im dampening** command in EXEC mode.

**show im dampening** [*interface type*] *ifhandle handle*

## Syntax Description

|                        |                                                                                                             |
|------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>interface type</b>  | (Optional) Interface type. For more information, use the question mark (?) online help function.            |
| <b>ifhandle handle</b> | (Optional) Identifies the caps node whose Interface Manager (IM) dampening information you want to display. |

## Command Default

If you do not specify an interface, then the system displays brief details about all dampened interfaces.

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you do not specify an interface, then the system displays brief details about all dampened interfaces.

The physical hardware (layer 1) is not the only part of an interface that can change state. L2 keepalive failure event is one of the many instances that can have a similar impact on routing protocols despite the underlying interface state staying UP. To take account of such events, when dampening is configured on an interface, it is applied independently to every layer. They all use the same parameters as the interface but they have their own penalty value which is incremented when that layer changes state.

Capsulations that may be dampened in this way include these:

- L2 basecaps, such as HDLC and PPP, which may flap if keepalives are not received due to events such as intermittent packet loss.
- L3 capsulations (for example ipv4, ipv6). These may be brought down if another link has a conflicting IP address configured.
- Other locations where negotiation takes place with a peer router, as in the case of PPP control protocols such as IPCP. If the negotiation fails, then the caps is brought down.

## Task ID

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

## Examples

The following example shows the output from the **show im dampening** command issued with default values:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/4/0/3
RP/0/RP0/CPU0:router(config-if)# no shutdown
RP/0/RP0/CPU0:router(config-if)# dampening
RP/0/RP0/CPU0:router# show im dampening
```

| Interface  | Proto | Caps  | Penalty Suppressed |
|------------|-------|-------|--------------------|
| -----      | ----- | ----- | -----              |
| POS0/4/0/3 | 0     | 0     | 0 NO               |

```
RP/0/RP0/CPU0:router# show im dampening interface POS 0/4/0/3
```

```
POS0/4/0/3 (0x05000d00)
Dampening enabled: penalty 0, not suppressed
underlying state: Up
 half_life: 1 reuse: 750
 suppress: 3000 max-suppress-time: 4
```

```
RP/0/RP0/CPU0:router# show interfaces POS 0/4/0/3
```

```
POS0/4/0/3 is up, line protocol is down
Dampening enabled: penalty 0, not suppressed
 half_life: 1 reuse: 750
 suppress: 3000 max-suppress-time: 4
Hardware is Packet-over-SONET
Description: ensoft-gsr5 POS 4\2
Internet address is Unknown
MTU 4474 bytes, BW 155520 Kbit
 reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, crc 16, controller loopback not set, keepalive set (10 sec)
Last clearing of "show interface" counters never
30 second input rate 0 bits/sec, 0 packets/sec
30 second output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 total input drops
0 drops for unrecognized upper-level protocol
Received 0 broadcast packets, 0 multicast packets
0 runts, 0 giants, 0 throttles, 0 parity
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
48 packets output, 1504 bytes, 0 total output drops
Output 0 broadcast packets, 0 multicast packets
0 output errors, 0 underruns, 0 applique, 0 resets
0 output buffer failures, 0 output buffers swapped out
```

The following sample output shows a POS interface with PPP basecaps and IPCP. The subsequent output for **show im dampening interface <ifname>** contains a table of any capsulations which have their own penalty as shown below:

```
RP/0/RP0/CPU0:router# show im dampening
```

| Interface              | Protocol | Capsulation | Pen   | Sup |
|------------------------|----------|-------------|-------|-----|
| -----                  | -----    | -----       | ----- | --- |
| GigabitEthernet0/0/0/0 |          |             | 629   | NO  |
| GigabitEthernet0/0/0/1 |          |             | 2389  | YES |
| POS0/2/0/0             |          |             | 0     | NO  |

```

POS0/2/0/0 <base> ppp 0 NO
POS0/2/0/0 ipv4 ipcp 0 NO

```

RP/0/RP0/CPU0:router# **show im dampening interface TenGigE 0/1/0/0**

```

TenGigE 0/1/0/0 (0x01180020)
Dampening enabled: Penalty 1625, SUPPRESSED (42 secs remaining)
 Underlying state: Down
 half-life: 1 reuse: 1000
 suppress: 1500 max-suppress-time: 4

```

| Protocol | Capsulation | Pen  | Suppression       | U-L State |
|----------|-------------|------|-------------------|-----------|
| ipv6     | ipv6        | 1625 | YES 42s remaining | Down      |



#### Note

When dampening is configured on an interface it is also applied independently to all capsulations on that interface. For example, the ppp or hdlc basecaps state can flap even while the interface stays up and if keepalives fail. The **show im dampening interface** command contains one line for each such capsulation as well as the interface itself as shown for the POS interface in the previous example.

**Table 36: show im dampening Field Descriptions**

| Field             | Description                                                                                                                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dampening         | Indicates the dampening state and penalty value: not suppressed, suppressed.                                                                                                                                                         |
| underlying state  | Underlying state of the interface: up, down, administratively down (if an interface has been configured to be “shutdown”).                                                                                                           |
| half_life         | This is the time (in minutes) at which the penalty on the interface would be half that of the original penalty (of 1000) when the interface transitions from UP to DOWN. It ranges from 1 to 45 minutes and the default is 1 minute. |
| reuse             | Penalty value below which a stable interface is unsuppressed. It ranges from 1 to 20000 and the default value is 750.                                                                                                                |
| suppress          | Limit at which an unstable interface is suppressed when the penalty value exceeds the suppress value. It ranges from 1 to 20000 and the default value is 2000.                                                                       |
| max-suppress-time | Maximum time (in minutes) that an interface can be suppressed. The default is 4 minutes.                                                                                                                                             |

**Related Commands**

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">dampening</a> , on page 618         | Turns on event dampening.                                                |
| <a href="#">shutdown (global)</a> , on page 640 | Disables an interface (forces an interface to be administratively down). |



# show interfaces

To display statistics for all interfaces configured on the router or for a specific node, use the **show interfaces** command in EXEC mode.

**show interfaces** [*type interface-path-id*] **all** | **local** | **location node-id**] [**accounting** | **brief** | **detail** | **summary**]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i>              | (Optional) Specifies the type of interface for which you want to display statistics. For more information, use the question mark (?) online help function.                                                                                                                      |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>all</b>               | (Optional) Displays interface information for all interfaces. This is the default.                                                                                                                                                                                              |
| <b>local</b>             | (Optional) Displays interface information for all interfaces in the local card.                                                                                                                                                                                                 |
| <b>location node-id</b>  | (Optional) Displays information about all interfaces on the specified node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.                                                                                                                     |
| <b>accounting</b>        | (Optional) Displays the number of packets of each protocol type that have been sent through the interface.                                                                                                                                                                      |
| <b>brief</b>             | (Optional) Displays brief information about each interface (one line per interface).                                                                                                                                                                                            |
| <b>detail</b>            | (Optional) Displays detailed information about each interface. This is the default.                                                                                                                                                                                             |
| <b>summary</b>           | (Optional) Displays a summary of interface information by interface type.                                                                                                                                                                                                       |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                                                                                                                            |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 2.0   | This command was introduced.                                                                                                                            |
| Release 3.8.4 | The err-disable interface state was added as a possible interface state output value for bundle member links that have been administratively shut down. |
| Release 4.0.0 | Added QoS drops to total input drops and total output drops statistics.                                                                                 |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

The **show interfaces** command displays statistics for the network interfaces. The resulting display shows the interface processors in slot order.

For example, if you type the **show interfaces** command without an interface type, you receive information for all the interfaces installed in the networking device. Only by specifying the interface *type*, *slot*, and *port* arguments can you display information for a particular interface.

If you enter a **show interfaces** command for an interface type that has been removed from the networking device, an error message is displayed: “Interface not found.”

The output displayed depends on the network for which an interface has been configured.

Beginning in Cisco IOS XR Release 3.8.4, when you shut down a bundle interface, the member links are put into err-disable link interface status and admin-down line protocol state.

**Note**

The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average is within 2 percent of the instantaneous rate of a uniform stream of traffic over that period.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

**Examples**

The following example shows the output from the **show interfaces** command. The output displayed depends on the type and number of interface cards in the networking device.

```
RP/0/RP0/CPU0:router# show interfaces tenGigE 0/0/0/1
```

```
TenGigE0/0/0/1 is administratively down, line protocol is administratively down
Hardware is TenGigE, address is 0800.4539.d909 (bia 0800.4539.d909)
Description: user defined string
Internet address is Unknown
MTU 1514 bytes, BW 10000000 Kbit
 reliability 255/255, txload 0/255, rxload 0/255
Encapsulation ARPA,
Full-duplex, 10000Mb/s, LR
output flow control is off, input flow control is off
loopback not set
ARP type ARPA, ARP timeout 01:00:00
Last clearing of "show interface" counters never
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
 0 packets input, 0 bytes, 0 total input drops
 0 drops for unrecognized upper-level protocol
Received 0 broadcast packets, 0 multicast packets
 0 runts, 0 giants, 0 throttles, 0 parity
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 0 packets output, 0 bytes, 0 total output drops
Output 0 broadcast packets, 0 multicast packets
 0 output errors, 0 underruns, 0 applique, 0 resets
 0 output buffer failures, 0 output buffers swapped out
 0 carrier transitions
```

In the following sample output, instance 1 is specified on a Packet-over-SONET/SDH (POS) card:

```
RP/0/RP0/CPU0:router# show interfaces POS 0/1/0/1

POS0/1/0/1 is administratively down, line protocol is administratively down
Hardware is Packet over SONET
Internet address is n.n.n.n/n
MTU 4474 bytes, BW 9953280 Kbit
 reliability 255/255, txload 0/255, rxload 0/255
Encapsulation HDLC, crc 32, controller loopback not set, keepalive not set
Last clearing of "show interface" counters never
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
 0 packets input, 0 bytes, 0 total input drops
 0 drops for unrecognized upper-level protocol
Received 0 broadcast packets, 0 multicast packets
 0 runts, 0 giants, 0 throttles, 0 parity
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 0 packets output, 0 bytes, 0 total output drops
Output 0 broadcast packets, 0 multicast packets
 0 output errors, 0 underruns, 0 applique, 0 resets
 0 output buffer failures, 0 output buffers swapped out
```

The following example shows sample output for ATM subinterface 0/4/2/0/1.1:

```
RP/0/RP0/CPU0:router# show interfaces ATM0/4/2/0/1.1

ATM0/4/2/0/1.1 is up, line protocol is up
Interface state transitions: 1
Hardware is ATM network sub-interface(s)
Description: Connected to PE22 C12406 ATM 0/4/0/0/1.1
Internet address is 10.212.4.21/24
MTU 4486 bytes, BW 1544 Kbit
 reliability Unknown, txload Unknown, rxload Unknown
Encapsulation AAL5/SNAP, controller loopback not set,
Last clearing of "show interface" counters Unknown
Datarate information unavailable.
Interface counters unavailable.
```

**Note**

The **show interfaces atm interface-path-id** command does not display data rates and counters for an ATM subinterface. Alternatively, you can use the **show interfaces atm interface-path-id accounting** command to view packet and character counters for each protocol, and the **show atm pvc vpi/vci** command to view cell, packet, and byte counters.

The following example shows bundle member links whose link interface status is “err-disable” and line protocol state is “admin-down” after the bundle interface has been administratively shut down using the **shutdown** command:

```
RP/0/RP0/CPU0:router# show interfaces brief
```

```
Thu May 6 06:30:55.797 DST
```

| Intf<br>Name    | Intf<br>State | LineP<br>State | Encap<br>Type | MTU<br>(byte) | BW<br>(Kbps) |
|-----------------|---------------|----------------|---------------|---------------|--------------|
| -----           | -----         | -----          | -----         | -----         | -----        |
| BE16            | admin-down    | admin-down     | ARPA          | 9216          | 1000000      |
| BE16.160        | up            | up             | 802.1Q VLAN   | 9220          | 1000000      |
| BE16.161        | up            | up             | 802.1Q VLAN   | 9220          | 1000000      |
| BE16.162        | up            | up             | 802.1Q VLAN   | 9220          | 1000000      |
| BE16.163        | up            | up             | 802.1Q VLAN   | 9220          | 1000000      |
| Lo0             | up            | up             | Loopback      | 1500          | Unknown      |
| Nu0             | up            | up             | Null          | 1500          | Unknown      |
| tt44190         | up            | up             | TUNNEL        | 1500          | Unknown      |
| tt44192         | up            | up             | TUNNEL        | 1500          | Unknown      |
| tt44194         | up            | up             | TUNNEL        | 1500          | Unknown      |
| tt44196         | up            | up             | TUNNEL        | 1500          | Unknown      |
| Mg0/RP0/CPU0/0  | up            | up             | ARPA          | 1514          | 100000       |
| Mg0/RP0/CPU0/1  | admin-down    | admin-down     | ARPA          | 1514          | 10000        |
| Gi0/1/0/0       | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/1       | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/2       | up            | up             | ARPA          | 9014          | 1000000      |
| Gi0/1/0/3       | up            | up             | ARPA          | 9014          | 1000000      |
| Gi0/1/0/3.160   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/3.161   | up            | up             | 802.1Q VLAN   | 9018          | 1000000      |
| Gi0/1/0/3.185   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/3.189   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/3.215   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/4       | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/5       | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/6       | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/7       | up            | up             | ARPA          | 9014          | 1000000      |
| Gi0/1/0/7.185   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/7.187   | up            | up             | 802.1Q VLAN   | 9014          | 1000000      |
| Gi0/1/0/7.189   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/7.210   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/7.211   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/7.215   | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/8       | up            | up             | ARPA          | 9014          | 1000000      |
| Gi0/1/0/9       | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/10      | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/11      | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/12      | up            | up             | ARPA          | 9216          | 1000000      |
| Gi0/1/0/13      | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/14      | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/15      | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |
| Gi0/1/0/16      | up            | up             | ARPA          | 9216          | 1000000      |
| Gi0/1/0/17      | up            | up             | ARPA          | 1514          | 1000000      |
| Gi0/1/0/18      | up            | up             | ARPA          | 9216          | 1000000      |
| Gi0/1/0/19      | up            | up             | ARPA          | 9014          | 1000000      |
| Gi0/1/0/19.2127 | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/19.2130 | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/20      | up            | up             | ARPA          | 9014          | 1000000      |
| Gi0/1/0/20.2125 | up            | up             | 802.1Q VLAN   | 9022          | 1000000      |
| Gi0/1/0/21      | admin-down    | admin-down     | ARPA          | 1514          | 1000000      |

```

Gi0/1/0/22 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/23 up up ARPA 9216 1000000
Gi0/1/0/24 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/25 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/26 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/27 up up ARPA 1514 1000000
Gi0/1/0/28 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/29 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/30 up up ARPA 9014 1000000
Gi0/1/0/30.215 up up 802.1Q VLAN 9018 1000000
Gi0/1/0/31 up up ARPA 9014 1000000
Gi0/1/0/32 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/33 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/34 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/35 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/36 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/37 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/38 admin-down admin-down ARPA 1514 1000000
Gi0/1/0/39 admin-down admin-down ARPA 1514 1000000
Te0/4/0/0 err-disable admin-down ARPA 1514 10000000
Te0/4/0/1 err-disable admin-down ARPA 1514 10000000
Te0/4/0/2 err-disable admin-down ARPA 1514 10000000
Te0/4/0/3 err-disable admin-down ARPA 1514 10000000
Te0/4/0/4 err-disable admin-down ARPA 1514 10000000
Te0/4/0/5 err-disable admin-down ARPA 1514 10000000
Te0/4/0/6 err-disable admin-down ARPA 1514 10000000
Te0/4/0/7 err-disable admin-down ARPA 1514 10000000
Te0/6/0/0 admin-down admin-down ARPA 1514 10000000
Te0/6/0/1 admin-down admin-down ARPA 1514 10000000
Te0/6/0/2 admin-down admin-down ARPA 1514 10000000
Te0/6/0/3 admin-down admin-down ARPA 1514 10000000

```

Table 37: show interfaces Field Descriptions

| Field                       | Description                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface name              | Displays the name of the current interface. For example, POS0/1/0/1.                                                                                                                                                                                                                                                                                                                               |
| Interface state             | Displays the state of the interface. For example, the interface is in the administratively up state.                                                                                                                                                                                                                                                                                               |
| Interface state transitions | Displays the number of times since the last reload that the interface transitioned from the administratively up state to the administrative down state and from the administratively down state to the administratively up state.                                                                                                                                                                  |
| line protocol state         | <p>Displays the state of the Layer 2 line protocol. This field may be different from the interface state if, for example, a keepalive failure has brought down the Layer 2.</p> <p><b>Note</b> The line protocol state is not the same as the protocol state displayed in the <b>show ip interfaces</b> command, because it is the state of Layer 2 (media) rather than Layer 3 (IP protocol).</p> |
| Hardware                    | Displays the current hardware type.                                                                                                                                                                                                                                                                                                                                                                |

| Field                                | Description                                                                                                                                                                                                                                                                                    |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Internet address is <i>n.n.n.n/n</i> | Displays the Layer 2 address (MAC address for Ethernet interfaces).<br><br><b>Note</b> Enter the <b>mac-address</b> command to configure the hardware address.                                                                                                                                 |
| bia                                  | Displays the burned-in address (BIA) for the interface. The BIA is the default L2 (MAC) address for the interface.<br><br><b>Note</b> The BIA is not configurable.                                                                                                                             |
| description                          | Displays the user-defined string that is associated with the interface.<br><br><b>Note</b> Enter the <b>description</b> command to configure the description associated with the interface.                                                                                                    |
| Internet Address                     | Displays the Layer 3 (IP) address for the interface.<br><br><b>Note</b> Enter the <b>ipv4 address</b> command to configure the internet address for the interface.                                                                                                                             |
| MTU                                  | Displays the maximum transmission unit (MTU) for the interface. The MTU is the maximum packet size that can be transmitted over the interface.<br><br><b>Note</b> The MTU field indicates the interface MTU. Enter the <b>mtu</b> command to configure a lower MTU value at the Layer 3 level. |
| BW                                   | Displays the bandwidth of the interface in kbps.                                                                                                                                                                                                                                               |
| reliability                          | Displays the proportion of packets that are not dropped and do not have errors.<br><br><b>Note</b> The reliability is shown as a fraction of 255.                                                                                                                                              |
| txload                               | Indicates the traffic flowing out of the interface as a proportion of the bandwidth.<br><br><b>Note</b> The txload is shown as a fraction of 255.                                                                                                                                              |
| rxload                               | Indicates the traffic flowing into the interface as a proportion of the bandwidth.<br><br><b>Note</b> The rxload is shown as a fraction of 255.                                                                                                                                                |
| Encapsulation                        | Layer 2 encapsulation installed on the interface.                                                                                                                                                                                                                                              |

| Field                           | Description                                                                                                                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CRC                             | <p>Indicates the length of the cyclic redundancy check (CRC), in bytes.</p> <p><b>Note</b> The CRC is not present for all interface types.</p> <p><b>Note</b> Enter the <b>pos crc</b> command to configure the CRC.</p>                                                         |
| loopback or controller loopback | <p>Indicates whether the hardware has been configured to be looped back.</p> <p><b>Note</b> Enter the <b>loopback</b> command to configure the loopback or controller loopback.</p>                                                                                              |
| keepalive                       | <p>Displays the configured keepalive value, in seconds.</p> <p><b>Note</b> Enter the <b>keepalive</b> command to configure the value of the keepalive field.</p> <p><b>Note</b> The <i>keepalive</i> field may not be present if it is not applicable to the interface type.</p> |
| Duplexity                       | <p>Displays the duplexity of the link.</p> <p><b>Note</b> This field is present only for shared media.</p> <p><b>Note</b> For some interface types, you can configure the duplexity by entering the <b>full-duplex</b> and <b>half-duplex</b> commands.</p>                      |
| Speed                           | Speed and bandwidth of the link in Mbps. This field is present only when other parts of the media info line are also displayed (see duplexity and media type).                                                                                                                   |
| Media Type                      | Media type of the interface.                                                                                                                                                                                                                                                     |
| output flow control             | Whether output flow control is enabled on the interface.                                                                                                                                                                                                                         |
| input flow control              | See output flow control.                                                                                                                                                                                                                                                         |
| ARP type                        | Address Resolution Protocol (ARP) type used on the interface. This value is not displayed on interface types that do not use ARP.                                                                                                                                                |
| ARP timeout                     | ARP timeout in <i>hours:mins:secs</i> . This value is configurable using the <b>arp timeout</b> command.                                                                                                                                                                         |
| Last clearing of counters       | Time since the following counters were last cleared using the <b>clear counters</b> exec command in <i>hours:mins:secs</i> .                                                                                                                                                     |

| Field                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 minute input rate  | <p>Average number of bits and packets received per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic).</p> <p><b>Note</b> The 5-minute period referenced in the command output is a load interval that is configurable under the interface. The default value is 5 minutes.</p> <p><b>Note</b> The 5-minute input should be used only as an approximation of traffic per second during a given 5-minute period. This rate is exponentially weighted average with a time constant of 5 minutes. A period of four time constants must pass before the average is within two percent of the instantaneous rate of a uniform stream of traffic over that period.</p>     |
| 5 minute output rate | <p>Average number of bits and packets transmitted per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic).</p> <p><b>Note</b> The 5-minute period referenced in the command output is a load interval that is configurable under the interface. The default value is 5 minutes.</p> <p><b>Note</b> The 5-minute output should be used only as an approximation of traffic per second during a given 5-minute period. This rate is exponentially weighted average with a time constant of 5 minutes. A period of four time constants must pass before the average is within two percent of the instantaneous rate of a uniform stream of traffic over that period.</p> |
| packets input        | Number of packets received on the interface that were successfully delivered to higher layers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| bytes input          | Total number of bytes successfully received on the interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| total input drops    | Total number of packets that were dropped after they were received. This includes packets that were dropped due to configured quality of service (QoS) or access control list (ACL) policies. QoS drops include policer drops, WRED drops, and tail drops. This does not include drops due to unknown Layer 3 protocol.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



| Field                                       | Description                                                                                                                                                                                                                                             |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| drops for unrecognized upper-level protocol | Total number of packets that could not be delivered because the necessary protocol was not configured on the interface.                                                                                                                                 |
| Received broadcast packets                  | Total number of Layer 2 broadcast packets received on the interface. This is a subset of the total input packet count.                                                                                                                                  |
| Received multicast packets                  | Total number of Layer 2 multicast packets received on the interface. This is a subset of the total input packet count.                                                                                                                                  |
| runts                                       | Number of received packets that were too small to be handled. This is a subset of the input errors count.                                                                                                                                               |
| giants                                      | Number of received packets that were too large to be handled. This is a subset of the input errors count.                                                                                                                                               |
| throttles                                   | Number of packets dropped due to throttling (because the input queue was full).                                                                                                                                                                         |
| parity                                      | Number of packets dropped because the parity check failed.                                                                                                                                                                                              |
| input errors                                | Total number of received packets that contain errors and hence cannot be delivered. Compare this to total input drops, which counts packets that were not delivered despite containing no errors.                                                       |
| CRC                                         | Number of packets that failed the CRC check.                                                                                                                                                                                                            |
| frame                                       | Number of packets with bad framing bytes.                                                                                                                                                                                                               |
| overrun                                     | Number of overrun errors experienced by the interface. Overruns represent the number of times that the receiver hardware is unable to send received data to a hardware buffer because the input rate exceeds the receiver's ability to handle the data. |
| ignored                                     | Total number of ignored packet errors. Ignored packets are those that are discarded because the interface hardware does not have enough internal buffers. Broadcast storms and bursts of noise can result in an increased number of ignored packets.    |
| abort                                       | Total number of abort errors on the interface.                                                                                                                                                                                                          |
| packets output                              | Number of packets received on the interface that were successfully delivered to higher layers.                                                                                                                                                          |

| Field                      | Description                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bytes output               | Total number of bytes successfully received on the interface.                                                                                                                                                                                   |
| total output drops         | Number of packets that were dropped before being transmitted. This includes packets that were dropped due to configured quality of service (QoS), (policer drops, WRED drops, and tail drops).                                                  |
| Received broadcast packets | Number of Layer 2 broadcast packets transmitted on the interface. This is a subset of the total input packet count.                                                                                                                             |
| Received multicast packets | Total number of Layer 2 multicast packets transmitted on the interface. This is a subset of the total input packet count.                                                                                                                       |
| output errors              | Number of times that the receiver hardware was unable to handle received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.                                                                   |
| underruns                  | Number of underrun errors experienced by the interface. Underruns represent the number of times that the hardware is unable to transmit data to a hardware buffer because the output rate exceeds the transmitter's ability to handle the data. |
| applique                   | Number of applique errors.                                                                                                                                                                                                                      |
| resets                     | Number of times that the hardware has been reset. The triggers and effects of this event are hardware-specific.                                                                                                                                 |
| output buffer failures     | Number of times that a packet was not output from the output hold queue because of a shortage of MEMD shared memory.                                                                                                                            |
| output buffers swapped out | Number of packets stored in main memory when the output queue is full; swapping buffers to main memory prevents packets from being dropped when output is congested. The number is high when traffic is bursty.                                 |
| carrier transitions        | Number of times the carrier detect (CD) signal of a serial interface has changed state.                                                                                                                                                         |

**Related Commands**

| Command                          | Description                                                                                                                        |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>show controller interface</b> | Displays information that is specific to the interface hardware statistics for all interfaces configured on the networking device. |

# shutdown (global)

To disable an interface (to force an interface to be administratively down), use the **shutdown** command in interface configuration mode. To enable an interface that has been shut down, use the **no** form of this command.

**shutdown**

**no shutdown**

## Syntax Description

This command has no keywords or arguments.

## Command Default

The interface is enabled by default and is disabled only when shutdown is configured.



### Note

When you add an interface to the system, or when all the configuration for an interface is lost or deleted, the interface is put in the shutdown state by the system adding the interface.

## Command Modes

Interface configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **shutdown** command to move the state of an interface to administratively down, which stops traffic flowing through the interface. This state does not stop other action from happening on the interface such as changes in configuration, protocols, encapsulations, and so forth.

The **shutdown** command also marks the interface as unavailable. To check whether the state of an interface is down, use the **show interfaces** command in EXEC mode, which displays the current state of the interface. An interface that has been shut down is shown as administratively down in the display from the **show interfaces** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

In the following example, POS interface 0/4/0/2 is turned off:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/4/0/2
RP/0/RP0/CPU0:router(config-if)# shutdown
```

## Related Commands

| Command                                       | Description                                                                            |
|-----------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">show interfaces</a> , on page 629 | Displays statistics for all interfaces configured on the router or on a specific node. |
| <b>show ip interface</b>                      | Displays IPv4 interface status and configuration.                                      |

 shutdown (global)



# Internal Ethernet Control Network Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring internal ethernet control on your router.

- [clear controller backplane ethernet clients, page 645](#)
- [clear controller backplane ethernet statistics, page 647](#)
- [show controllers backplane ethernet brief, page 649](#)
- [show controllers backplane ethernet clients, page 651](#)
- [show controllers backplane ethernet detail, page 656](#)
- [show controllers backplane ethernet manageability bridge basic, page 661](#)
- [show controllers backplane ethernet manageability bridge fdb-entry, page 663](#)
- [show controllers backplane ethernet manageability bridge forwarding, page 666](#)
- [show controllers backplane ethernet manageability bridge list, page 669](#)
- [show controllers backplane ethernet manageability bridge port, page 671](#)
- [show controllers backplane ethernet manageability bridge span-tree, page 676](#)
- [show controllers backplane ethernet manageability bridge transparent, page 679](#)
- [show controllers backplane ethernet manageability interface attributes, page 681](#)
- [show controllers backplane ethernet manageability interface list, page 684](#)
- [show controllers backplane ethernet manageability interface mau-autonet-info, page 687](#)
- [show controllers backplane ethernet manageability interface mau-info, page 691](#)
- [show controllers backplane ethernet manageability interface mau-jack-type, page 697](#)
- [show controllers backplane ethernet manageability interface statistics, page 699](#)
- [show controllers backplane ethernet multicast groups, page 703](#)
- [show controllers switch ports, page 705](#)
- [show controllers switch statistics, page 707](#)

- [show spantree](#), page 710



# clear controller backplane ethernet clients

To clear the aggregate client statistics of traffic sent and received over the control Ethernet, use the **clear controller backplane ethernet clients** command in administration EXEC mode.

**clear controller backplane ethernet clients** {**client-id statistics**| **all statistics**} **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                        |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>client-id</i>               | Client ID. Range is from 1 through 33.                                                                                                                 |
| <b>statistics</b>              | Clears a list of client statistics for the specified client ID.                                                                                        |
| <b>all</b>                     | Clears a list of all client applications and their IDs.                                                                                                |
| <b>location</b> <i>node-id</i> | Clears the node or the controller information.<br><b>Note</b> Use the <b>show platform</b> command to see a list of all nodes currently in the system. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                                                                                                   |
|---------------|--------------------------------------------------------------------------------------------------------------------------------|
| Release 3.3.0 | This command was introduced. This command replaces the <b>clear controller backplane ethernet location statistics</b> command. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID | Operations |
|---------|------------|
| system  | execute    |

## Examples

The following example shows how to clear client statistics for client ID 1 on the node at 0/1/1:

```
RP/0/RP0/CPU0:router(admin)# clear controller backplane ethernet clients 1 statistics
```

**clear controller backplane ethernet clients**

**location 0/1/1**

The following example shows how to clear all client statistics on the node at 0/1/1:

```
RP/0/RP0/CPU0:router(admin)# clear controller backplane ethernet clients all statistics
location 0/1/1
```

**Related Commands**

| Command                                                                  | Description                                                                            |
|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet clients, on page 651</a> | Displays information about client applications in a particular location.               |
| <a href="#">show controllers backplane ethernet detail, on page 656</a>  | Displays detailed information about the backplane interfaces in a particular location. |

# clear controller backplane ethernet statistics

To clear the aggregate statistics of traffic sent and received over the control Ethernet, use the **clear controller backplane ethernet statistics** command in administration EXEC mode.

**clear controller backplane ethernet statistics location** *node-id*

## Syntax Description

**location** *node-id*

Clears the node of statistics.

**Note** Use the **show platform** command to see a list of all nodes currently in the system.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                                                                                                   |
|---------------|--------------------------------------------------------------------------------------------------------------------------------|
| Release 3.3.0 | This command was introduced. This command replaces the <b>clear controller backplane ethernet location statistics</b> command. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID | Operations |
|---------|------------|
| system  | execute    |

## Examples

The following example shows how to clear all statistics on the node at 0/1/1:

```
RP/0/RP0/CPU0:router(admin)# clear controller backplane ethernet statistics location 0/1/1
```

 clear controller backplane ethernet statistics**Related Commands**

| Command                                                                                 | Description                                                                              |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet brief</a> , on <a href="#">page 649</a> | Displays brief information about backplane Ethernet interfaces in a particular location. |

# show controllers backplane ethernet brief

To display brief information about backplane Ethernet interfaces in a particular location, use the **show controllers backplane ethernet brief** command in administration EXEC mode.

**show controllers backplane ethernet brief location** *node-id*

## Syntax Description

|                                |                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i> | Displays brief backplane Ethernet information for a specified location.                  |
| <b>Note</b>                    | Use the <b>show platform</b> command to see a list of all nodes currently in the system. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                                                                                                                                                          |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.3.0 | This command was introduced. This command replaces the <b>show controllers backplane ethernet local brief</b> and <b>show controllers backplane ethernet location brief</b> commands. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

## Examples

The following example shows the output from the **show controllers backplane ethernet brief** command:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet brief location 0/1/0
FastEthernet0_0_CPU0 (local) is up, MTU 1514 bytes
 57569 packets input, 5999749 bytes
```

```
36963 packets output, 4105673 bytes
```

**Table 38: show controllers backplane ethernet brief Field Descriptions**

| Field          | Description                                                                                                       |
|----------------|-------------------------------------------------------------------------------------------------------------------|
| MTU            | Maximum packet size, in bytes, that a particular interface can handle.                                            |
| packets input  | Total number of packets received.                                                                                 |
| packets output | Total number of packets transmitted.                                                                              |
| bytes          | Total number of bytes, including data and MAC encapsulation, in the error-free packets transmitted by the system. |

**Related Commands**

| Command                                                                                    | Description                                                                            |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet clients, on page 651</a>                   | Displays information about client applications in a particular location.               |
| <a href="#">show controllers backplane ethernet detail, on page 656</a>                    | Displays detailed information about the backplane interfaces in a particular location. |
| <a href="#">show controllers backplane ethernet manageability bridge list, on page 669</a> | Displays the CE bridges distributed across a Cisco CRS system.                         |

# show controllers backplane ethernet clients

To display information about client applications in a particular location, use the **show controllers backplane ethernet clients** command in administration EXEC mode.

**show controllers backplane ethernet clients** [*client-id statistics*] **all** **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>client-id</i>               | Client ID. Range is from 1 through 33.                                                                                                                                                     |
| <b>statistics</b>              | Displays a list of client statistics for the specified client ID.                                                                                                                          |
| <b>all</b>                     | Displays a list of all client applications and their IDs.                                                                                                                                  |
| <b>location</b> <i>node-id</i> | Displays a list of all client applications and their IDs for a specified location.<br><b>Note</b> Use the <b>show platform</b> command to see a list of all nodes currently in the system. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                                                                                                                                                              |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.3.0 | This command was introduced. This command replaces the <b>show controllers backplane ethernet local clients</b> and <b>show controllers backplane ethernet location clients</b> commands. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows the output from the **show controllers backplane ethernet clients** command, which displays detailed statistics for a specified backplane client application:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet clients 2 statistics
location 0/rp0/cpu0

Client GSP, ES Client Id 2, PID 127057 running on FastEthernet0_RP0_CPU0
LWM calls 1 open, 0 close, 0 close callback, 0 unblocks
1610 packets input, 531492 bytes
1601 packets delivered, 518082 bytes
0 packets discarded (0 bytes) in garbage collection
0 (0 bytes) unicast packets filtered
9 (3750 bytes) multicast packets filtered
0 (0 bytes) buffer mgmt policy discards
0 (0 bytes) locking error discards
0 packets waiting for client

1846 packets output, 905259 bytes, 0 could not be transmitted
Packets output at high priority : 251
Packets output at med priority : 0
Packets output at low priority : 1595
Out-of-packet write rejects (high) : 0
Out-of-packet write rejects (med) : 0
Out-of-packet write rejects (low) : 0
DMA write rejects (high) : 0
DMA write rejects (med) : 0
DMA write rejects (low) : 0

Async calls open 1, close 0 (Number of async open calls by the client with eth_server)

Rx pkts at high level : produced 246, lipc 0, depth 0, drops 0 (Rx packets produced,
consumed, queue depth, drops at various levels)
Rx pkts at high level : consumed 246, fails 0, wakeups 240
Rx pkts at med level : produced 0, lipc 0, depth 0, drops 0
Rx pkts at med level : consumed 0, fails 0, wakeups 0
Rx pkts at low level : produced 1355, lipc 0, depth 0, drops 0
Rx pkts at low level : consumed 1355, fails 0, wakeups 1032

Rx mem score 0, alloc fails 0, free fails 0 (Rx mem score for this client, alloc
free fails)
Rx mem threshold exceeded rejects 0, mutex lock fails 0 (Rx mem drops due to non-avail
of buffers, mutex lock fails)

Tx pkts at high level : produced 251, depth 0, fails 0, drops 0 (Tx packets produced,
consumed, queue depth, drops at various levels)
Tx pkts at high level : consumed 251, drops 0, wakeups 251
Tx pkts at med level : produced 0, depth 0, fails 0, drops 0
Tx pkts at med level : consumed 0, drops 0, wakeups 0
Tx pkts at low level : produced 1595, depth 0, fails 0, drops 0
Tx pkts at low level : consumed 1595, drops 0, wakeups 1110

Tx mem score 0, server held 0, alloc fails 0, free fails 0 (Tx mem score for this client,
alloc free fails)
Tx mem threshold exceeded rejects 0, mutex lock fails 0
```

**Table 39: show controllers backplane ethernet clients Field Descriptions (For a Specified Client)**

| Field                      | Description                                         |
|----------------------------|-----------------------------------------------------|
| Client GSP                 | Name of the Ethernet server client.                 |
| ES Client Id <i>number</i> | Numerical identifier of the Ethernet server client. |



| Field                                                      | Description                                                                                               |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| PID <i>number</i> running on Fast Ethernet <i>location</i> | Process identifier of the Ethernet server client.                                                         |
| LWM calls                                                  | Number of corresponding lightweight messaging (LWM) calls performed by the client.                        |
| packets input, bytes                                       | Total packet bytes received by the Ethernet server for this client.                                       |
| packets delivered, bytes                                   | Total packet bytes delivered by the Ethernet server to the client.                                        |
| packets discarded (bytes) in garbage collection            | Number of packets and packet bytes discarded because the client did not pick up the packet in 10 seconds. |
| (bytes) unicast packets filtered                           | Number of unicast packets and unicast packet bytes not destined for this client.                          |
| (bytes) multicast packets filtered                         | Number of multicast packets and multicast packet bytes not destined for this client.                      |
| (bytes) buffer mgmt policy discards                        | Number of packets and packet bytes dropped because the client used too many Ethernet server buffers.      |
| (bytes) locking error discards                             | Number of packets and packet bytes discarded because of locking error discards.                           |
| packets waiting for client                                 | Number of packets waiting to be picked up by the client.                                                  |
| packet output, bytes                                       | Number of packets and packet bytes output by the Ethernet server for this client.                         |
| could not be transmitted                                   | Number of packets that could not be transmitted by the Ethernet server for this client.                   |
| Packets output at high, medium, low priority               | Number of packets output at high, medium, and low priorities.                                             |
| Out-of-packet write rejects (high, medium, low)            | Number of packet write failures at high, medium, and low priorities.                                      |
| DMA write rejects (high, medium, low)                      | Number of packet write failures by the driver at high, medium, and low priorities.                        |
| Async calls open, close                                    | Number of asynchronous calls performed by the client.                                                     |

| Field                                                                                       | Description                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rx pkts at high, med, low levels (produced, consumed, queue depth, drops at various levels) | Number of packets received by the Ethernet server and produced onto the queueing and dispatching (QAD) queue for the client. Also, number of packets consumed by the client, depth off the queue, and dropped. |
| Rx pkts at high, med, low levels (consumed, fails, wakeups)                                 | Number of packets consumed by the client from the QAD queue. Also, number of packets that failed and number of wakeups.                                                                                        |
| Rx mem score                                                                                | Number of buffers currently held by the client on the receive side.                                                                                                                                            |
| alloc fails                                                                                 | Number of receive allocation failures for the client.                                                                                                                                                          |
| free fails                                                                                  | Number of free failures for the client.                                                                                                                                                                        |
| Rx mem threshold exceeded rejects                                                           | Number of packets dropped because the client exceeded its threshold.                                                                                                                                           |
| mutex lock fails                                                                            | Number of mutex lock failures on the receive side.                                                                                                                                                             |
| Tx pkts at high, med, low levels (produced, depth, fails, drops)                            | Number of packets enqueued onto the QAD queue by the client. Also, the depth off the queue and number of packets that failed and were dropped.                                                                 |
| Tx pkts at high, med, low levels (consumed, drops, wakeups)                                 | Number of packets dequeued from the QAD queue by the Ethernet server. Also, number of packets that were dropped and number of wakeups.                                                                         |
| Tx mem score                                                                                | Number of buffers currently held by the client on the transmit side.                                                                                                                                           |
| server held                                                                                 | Number of packets given by the client and not yet transmitted by the Ethernet server.                                                                                                                          |
| alloc fails                                                                                 | Number of allocation failures for the client on the transmit side.                                                                                                                                             |
| free fails                                                                                  | Number of free failures on the transmit side.                                                                                                                                                                  |
| Tx mem threshold exceeded rejects                                                           | Number of transmit packet failures because the client exceeded its quota.                                                                                                                                      |
| mutex lock fails                                                                            | Number of mutex lock failures on the transmit side.                                                                                                                                                            |

The following example shows the output from the **show controllers backplane ethernet clients** command, which displays a summary of statistics for all of the backplane client applications:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet clients all location
0/0/CPU0
```

| Intf<br>Name | Client ethernet<br>server id | Client<br>Process Id | Description                 |
|--------------|------------------------------|----------------------|-----------------------------|
| FE0_0_CPU0   | 1                            | 12307                | QNX network manager         |
|              | 2                            | 28726                | Group services              |
|              | 3                            | 0                    | Reserved for Attach         |
|              | 4                            | 0                    | Plugin controller           |
|              | 5                            | 0                    | Designated SC               |
|              | 6                            | 0                    | HFR H/W diags               |
|              | 7                            | 0                    | IP packet handler           |
|              | 8                            | 16415                | Redundancy controller       |
|              | 9                            | 0                    | HFR Virtual console         |
|              | 10                           | 12312                | HFR Virtual terminal        |
|              | 11                           | 12305                | Control ethernet echo       |
|              | 12                           | 0                    | Control eth echo reply      |
|              | 13                           | 0                    | Card Configuration Protocol |
|              | 14                           | 0                    | Reserved for Attach         |
|              | 15                           | 0                    | Chassis controller          |
|              | 16                           | 0                    | Forwarding driver           |
|              | 17                           | 16414                | MBI hello                   |
|              | 18                           | 0                    | MBI Boot Server Source      |
|              | 19                           | 0                    | HSR ES client               |
|              | 20                           | 0                    | Test application 1          |
|              | 21                           | 0                    | Test application 2          |
|              | 22                           | 0                    | Test client out-of-band     |

**Table 40: show controllers backplane ethernet clients Field Descriptions (For All Clients)**

| Field                     | Description                                                       |
|---------------------------|-------------------------------------------------------------------|
| Intf Name                 | Identifies the Ethernet interface.                                |
| Client ethernet server id | Identifies the Ethernet server for the specified interface.       |
| Client process id         | Identifies the client process running on the specified interface. |
| Description               | Describes the backplane client application.                       |

## Related Commands

| Command                                                                                     | Description                                                                              |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet brief</a> , on page 649                     | Displays brief information about backplane Ethernet interfaces in a particular location. |
| <a href="#">show controllers backplane ethernet detail</a> , on page 656                    | Displays detailed information about the backplane interfaces in a particular location.   |
| <a href="#">show controllers backplane ethernet manageability bridge list</a> , on page 669 | Displays the CE bridges distributed across a Cisco CRS system.                           |

# show controllers backplane ethernet detail

To display detailed information about the backplane interfaces in a particular location, use the **show controllers backplane ethernet detail** command in administration EXEC mode.

**show controllers backplane ethernet detail location** *node-id*

## Syntax Description

|                                |                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i> | Displays detailed information about backplane interfaces for a specified location.       |
| <b>Note</b>                    | Use the <b>show platform</b> command to see a list of all nodes currently in the system. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                                                                                                                                                            |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.3.0 | This command was introduced. This command replaces the <b>show controllers backplane ethernet local detail</b> and <b>show controllers backplane ethernet location detail</b> commands. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

## Examples

The following example shows the output from the **show controllers backplane ethernet detail** command:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet detail location 0/rp0/cpu0

FastEthernet0_RP0_CPU0 is up
 Hardware is 10/100 Ethernet, H/W address is 5246.4800.0201
 Internet address is 10.0.2.1
```

```

MTU 1514 bytes
Encapsulation HFRIES (Platform Internal Ethernet Server)
Mode : Full Duplex, Rate : 100Mb/s
 11576 packets input, 809064 bytes, 0 total input drops
 11346 driver inputs, 11175 driver callbacks
 0 packets discarded (0 bytes) in garbage collection
 12 packets discarded (5784 bytes) in rcv processing
 0 incomplete frames discarded
 0 packets discarded due to bad headers
 0 packets waiting for clients
 0 packets waiting on Rx
 Packets waiting at high priority : 0
 Packets waiting at med priority : 0
 Packets waiting at low priority : 0
 Received 3 broadcast packets, 54 multicast packets
 Input errors: 0 CRC, 0 overrun, 0 alignment, 0 length, 0 collision
 12105 packets output, 17021692 bytes, 0 total output drops
 Output 0 broadcast packets, 555 multicast packets
 Output errors: 0 underruns, 0 aborts, 0 loss of carrier
 Write rejects : 0
 Rx mem score 1000, alloc fails 0, free fails 0, retrieved buffers 0 (memory score on
Rx side, 1000 is expected, alloc, free fails on Rx side)
 Rx mem threshold exceeded rejects 0, mutex lock fails 0 (Memory threshold exceeded due
to lack of buffers on Rx)
 Tx mem score 1, server held 0, alloc fails 0, free fails 0 (memory score on Tx side)
 Tx mem threshold exceeded rejects 0, mutex lock fails 0, retrieved buffers 0
 Tx quota for high : 100 med : 100 low : 799 (Buffer quota on tx side,
expected is arnd 100, 100, 800)
 Tx waits for high : 0 med : 0 low : 0 (tx stalls (lwm+qad) due to
non-avail of buffers)
 Tx (QAD) waits for high : 0 med : 0 low : 0 (tx stalls (qad only))
 Tx (QAD) wakeups for high : 146 med : 0 low : 22 (tx wakeups)

```

**Table 41: show controllers backplane ethernet detail Field Descriptions**

| Field                             | Description                                                                                                    |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------|
| FastEthernetnode is <i>status</i> | Status of the node, which can be up or down.                                                                   |
| Hardware                          | Hardware type, followed by the hardware address.                                                               |
| Internet address                  | IP address of the interface.                                                                                   |
| MTU                               | Maximum packet size, in bytes, that a particular interface can handle.                                         |
| Encapsulation                     | Encapsulation method assigned to the interface.                                                                |
| Mode                              | Operating mode of the interface, followed by transmission data.                                                |
| packets input                     | Total number of packets received.                                                                              |
| bytes                             | Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system. |
| total input drops                 | Total number of packets dropped from the input queue because the queue was full.                               |

| Field                                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| driver inputs                                   | Number of packets input inside the software driver.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| driver callbacks                                | Number of callback invocations by the software driver.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| packets discarded (bytes) in garbage collection | Number of packets and bytes discarded.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| packets discarded (bytes) in recv processing    | Number of packets and bytes discarded.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| incomplete frames discarded                     | Number of incomplete frames dropped in the receive direction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| packets discarded due to bad headers            | Number of packets dropped because of bad headers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| packets waiting for clients                     | Number of packets to be picked up by the client.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| packets waiting on Rx                           | Number of packets to be processed by the Ethernet server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Packets waiting at high/med/low priority        | Number of high-, medium-, and low-priority packets to be processed by the Ethernet server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Received broadcast packets, multicast packets   | Total number of broadcast and multicast packets received by the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Input errors                                    | <p>Number of errors received by the interface. Input errors occur when incoming cells are dropped or corrupted. The possible input errors are as follows:</p> <ul style="list-style-type: none"> <li>• CRC—Number of times that the checksum calculated from the data received did not match the checksum from the transmitted data.</li> <li>• overrun—Number of times that the receiver hardware was incapable of handing received data to a hardware buffer because the input rate exceeded the receiver's capability to handle the data.</li> <li>• alignment—Number of nonoctets received.</li> <li>• length—Number of times the interface prevented the ASIC from overrunning a maximum transmission unit (MTU) size.</li> <li>• collision—Number of messages retransmitted because of an Ethernet collision.</li> </ul> |
| packets output                                  | Total number of messages transmitted by the system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Field                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bytes                                       | Total number of bytes, including data and MAC encapsulation, in the error-free packets transmitted by the system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| total output drops                          | Total number of packets dropped from the output queue because the queue was full.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Output broadcast packets, multicast packets | Total number of broadcast and multicast packets transmitted by the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Output errors                               | <p>Number of errors transmitted on the interface. Output errors occur when outgoing cells are dropped or corrupted. The possible types output errors are as follows:</p> <ul style="list-style-type: none"> <li>• underruns—Number of times that the far-end transmitter has been running faster than the near-end receiver can handle.</li> <li>• aborts—Number of illegal sequences of one bits on the interface.</li> <li>• loss of carrier—Number of times the interface was reset because the carrier detect line of that interface was up, but the line protocol was down.</li> </ul> |
| Write rejects                               | Number of software driver errors on the transmit side.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Rx mem score                                | Number of overall outstanding Ethernet server receive buffers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| alloc fails                                 | Number of allocation failures in the receive direction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| free fails                                  | Number of free failures in the receive direction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| retrieved buffers                           | Number of receive buffers retrieved.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Rx mem threshold exceeded rejects           | Number of receive buffer rejects because of a threshold overrun.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| mutex lock fails                            | Number of mutex lock failures in the receive direction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Tx mem score                                | Number of outstanding transmit buffers for all clients.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| server held                                 | Number of buffers, with packets not yet transmitted, held by the Ethernet server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Field                             | Description                                                                                         |
|-----------------------------------|-----------------------------------------------------------------------------------------------------|
| alloc fails                       | Number of allocation failures in the transmit direction.                                            |
| free fails                        | Number of free failures in the transmit direction.                                                  |
| Tx mem threshold exceeded rejects | Number of transmit buffer rejects because of a threshold overrun.                                   |
| mutex lock fails                  | Number of mutex lock failures in the transmit direction.                                            |
| retrieved buffers                 | Number of transmit buffers retrieved.                                                               |
| Tx quota for high/med/low         | Total number of buffers available for transmission on the ring.                                     |
| Tx waits for high/med/low         | Number of times the transmit thread had to wait because of a buffer quota shortage for LWM clients. |
| Tx (QAD) waits for high/med/low   | Number of times queueing and dispatching (QAD) clients had to wait because of a quota shortage.     |
| Tx (QAD) wakeups for high/med/low | Number of times the transmit thread was woken up.                                                   |

**Related Commands**

| Command                                                                                    | Description                                                                              |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet brief, on page 649</a>                     | Displays brief information about backplane Ethernet interfaces in a particular location. |
| <a href="#">show controllers backplane ethernet clients, on page 651</a>                   | Displays information about client applications in a particular location.                 |
| <a href="#">show controllers backplane ethernet manageability bridge list, on page 669</a> | Displays the CE bridges distributed across a Cisco CRS system.                           |



# show controllers backplane ethernet manageability bridge basic

To display basic information for a Control Ethernet (CE) bridge, use the **show controllers backplane ethernet manageability bridge** command in administration EXEC mode.

**show controllers backplane ethernet manageability bridge** *bridge-name* **basic**

## Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>bridge-name</i> | Identifies the bridge whose information you want to display. For the <i>bridge-name</i> argument, use the following naming notation:<br><br>ControlEthernet <i>rack_slot_module</i> _ [S0   S1]<br><br>The underscore between values is required as part of the notation. A sample bridge name is ControlEthernet0_RP0_CPU0_S0.<br><br><b>Note</b> To view a list of CE bridges currently in the system, enter the <b>show controllers backplane ethernet manageability bridge list</b> command. |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the bridge naming notation (ControlEthernet*rack\_slot\_module*\_[S0 | S1]) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.

Each route processor (RP) card has one S0 bridge, and each system controller (SC) card has one S0 bridge and one S1 bridge.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display basic information for a bridge named ControlEthernet0\_RP0\_CPU0\_S0:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 basic
```

```
Bridge Base Information

Bridge Name : ControlEthernet0_RP0_CPU0_S0
Bridge Address : 00 11 93 ef e8 e2
Number of Ports : 18
Bridge Type : Transparent Only

```

**Table 42: show controllers backplane ethernet manageability bridge basic Field Descriptions**

| Field           | Description                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Name     | Displays the name of the bridge in the ControlEthernetrack_slot_module_[S0   S1] naming notation.                                                                                                                              |
| Bridge Address  | Displays the MAC address of the bridge.                                                                                                                                                                                        |
| Number of Ports | Displays the number of ports controlled by the bridge.                                                                                                                                                                         |
| Bridge Type     | Indicates the type of bridging that is being performed. Valid values include the following: <ul style="list-style-type: none"> <li>• Unknown</li> <li>• Transparent Only</li> <li>• Sourceroute Only</li> <li>• SRT</li> </ul> |

**Related Commands**

| Command                                                                                     | Description                                                    |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability bridge list</a> , on page 669 | Displays the CE bridges distributed across a Cisco CRS system. |

# show controllers backplane ethernet manageability bridge fdb-entry

To display the forwarding table entry for a Control Ethernet (CE) bridge port, use the **show controllers backplane ethernet manageability bridge fdb-entry** command in administration EXEC mode.

**show controllers backplane ethernet manageability bridge** *bridge-name* **fdb-entry** *mac-address*

## Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>bridge-name</i> | <p>Identifies the bridge whose information you want to display. For the <i>bridge-name</i> argument, use the following naming notation:</p> <p>ControlEthernetrack_slot_module_[S0   S1]</p> <p>The underscore between values is required as part of the notation. A sample bridge name is ControlEthernet0_RP0_CPU0_S0.</p> <p><b>Note</b> To view a list of CE bridges currently in the system, enter the <b>show controllers backplane ethernet manageability bridge list</b> command.</p> |
| <i>mac-address</i> | <p>Identifies a bridge port with the specified 48-bit MAC address. You must enter the address in the <i>H.H.H</i> format.</p> <p><b>Note</b> To view the forwarding table of a CE bridge, which includes 48-bit MAC addresses, enter the <b>show controllers backplane ethernet manageability bridge forwarding</b> command</p>                                                                                                                                                               |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the bridge naming notation (ControlEthernetrack\_slot\_module\_[S0 | S1]) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.

- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.

Each route processor (RP) card has one S0 bridge, and each system controller (SC) card has one S0 bridge and one S1 bridge.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display the forwarding table entry for a bridge port with the MAC address of 5246.4800.0040:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 fdb-entry 5246.4800.0040
```

```

Bridge Name : ControlEthernet0_RP0_CPU0_S0
 Transparent Bridging Forwarding Table

Mac_Address Ingress_Port Status

5246.4800.0040 12 Learned
```

**Table 43: show controllers backplane ethernet manageability bridge fdb-entry Field Descriptions**

| Field        | Description                                                                                                                                                                                |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Name  | Displays the name of the bridge in the ControlEthernetrack_slot_module_[S0   S1] naming notation.                                                                                          |
| MAC Address  | Displays a unicast 48-bit MAC address for which the bridge has forwarding and/or filtering information.                                                                                    |
| Ingress Port | Displays the number of the port. A value of 0 indicates that the port number has not been learned, but that the bridge does have some forwarding/filtering information about this address. |

| Field  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status | <p>Displays the status of the port, which can be one of the following:</p> <ul style="list-style-type: none"><li>• Other—None of the other values applies.</li><li>• Invalid—The forwarding table entry is no longer valid (for example, it was learned and has since aged out), but has not yet been flushed from the table.</li><li>• Learned—The port was learned and is being used.</li><li>• Self—The MAC address of the port represents one of the addresses.</li><li>• Mgmt—The MAC address of the port is also the value of an existing instance of dot1dStaticAddress.</li></ul> |

**Related Commands**

| Command                                                                                           | Description                                                    |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability bridge forwarding</a> , on page 666 | Displays a forwarding database table for a CE bridge.          |
| <a href="#">show controllers backplane ethernet manageability bridge list</a> , on page 669       | Displays the CE bridges distributed across a Cisco CRS system. |
| <a href="#">show controllers backplane ethernet manageability bridge port</a> , on page 671       | Displays information for a CE bridge port.                     |

# show controllers backplane ethernet manageability bridge forwarding

To display a forwarding database table for a Control Ethernet (CE) bridge, use the **show controllers backplane ethernet manageability bridge forwarding** command in administration EXEC mode.

**show controllers backplane ethernet manageability bridge** *bridge-name* **forwarding**

## Syntax Description

*bridge-name* Identifies the bridge whose information you want to display. For the *bridge-name* argument, use the following naming notation:

ControlEthernettrack\_slot\_module\_[S0 | S1]

The underscore between values is required as part of the notation. A sample bridge name is ControlEthernet0\_RP0\_CPU0\_S0.

**Note** To view a list of CE bridges currently in the system, enter the **show controllers backplane ethernet manageability bridge list** command.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the bridge naming notation (ControlEthernettrack\_slot\_module\_[S0 | S1]) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.

Each route processor (RP) card has one S0 bridge, and each system controller (SC) card has one S0 bridge and one S1 bridge.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display forwarding database information a bridge named ControlEthernet0\_RP0\_CPU0\_S0:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 forwarding
```

```

Bridge Name : ControlEthernet0_RP0_CPU0_S0
Trasparent Bridging Forwarding Table

Mac_Address Ingress_Port Status

0000.0000.0000 0 Learned
0000.000f.ffff 0 Learned
0000.0102.0304 1 Learned
0249.4450.0000 0 Learned
0249.4450.0001 0 Learned
0249.4450.0002 0 Learned
5246.4800.0010 9 Learned
5246.4800.0011 9 Learned
5246.4800.0040 12 Learned
5246.4800.0041 12 Learned
5246.4800.0042 12 Learned
5246.4800.0060 14 Learned
5246.4800.0061 14 Learned
5246.4800.0201 0 Learned
5246.4800.0211 1 Learned
5246.4800.0800 2 Learned
5246.4800.0810 3 Learned
5246.4800.0820 4 Learned
5246.4800.0830 5 Learned
ffff.ffff.ffff 0 Learned
```

**Table 44: show controllers backplane ethernet manageability bridge forwarding Field Descriptions**

| Field        | Description                                                                                                                                                                                |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Name  | Displays the name of the bridge in the ControlEthernetrack_slot_module_[S0   S1] naming notation.                                                                                          |
| MAC Address  | Displays a unicast 48-bit MAC address for which the bridge has forwarding and/or filtering information.                                                                                    |
| Ingress Port | Displays the number of the port. A value of 0 indicates that the port number has not been learned, but that the bridge does have some forwarding/filtering information about this address. |

| Field  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status | <p>Displays the status of the port, which can be one of the following:</p> <ul style="list-style-type: none"> <li>• Other—None of the other values applies.</li> <li>• Invalid—The forwarding table entry is no longer valid (for example, it was learned and has since aged out), but has not yet been flushed from the table.</li> <li>• Learned—The port was learned and is being used.</li> <li>• Self—The MAC address of the port represents one of the addresses.</li> <li>• Mgmt—The MAC address of the port is also the value of an existing instance of dot1dStaticAddress.</li> </ul> |

**Related Commands**

| Command                                                                                          | Description                                                    |
|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability bridge fdb-entry</a> , on page 663 | Displays the forwarding table entry for a CE bridge port.      |
| <a href="#">show controllers backplane ethernet manageability bridge list</a> , on page 669      | Displays the CE bridges distributed across a Cisco CRS system. |



# show controllers backplane ethernet manageability bridge list

To display the Control Ethernet (CE) bridges distributed across a Cisco CRS system, use the **show controllers backplane ethernet manageability bridge list** command in administration EXEC mode.

**show controllers backplane ethernet manageability bridge list**

**Syntax Description** This command has no keywords or arguments.

**Command Default** None

**Command Modes** Administration EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.8.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The Cisco CRS system is comprised of multiple CE bridges. Each route processor (RP) card has one S0 bridge, and each system controller (SC) card has one S0 bridge and one S1 bridge.

| Task ID | Task ID | Operations |
|---------|---------|------------|
|         | fabric  | read       |
|         | system  | read       |

**Examples** The following example displays a list of CE bridges that comprise a routing system:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge list

ControlEthernet0_RP0_CPU0_S0
ControlEthernet0_RP1_CPU0_S0
ControlEthernet1_RP0_CPU0_S0
ControlEthernet1_RP1_CPU0_S0
ControlEthernetF0_SC0_CPU0_S0
ControlEthernetF0_SC0_CPU0_S1
ControlEthernetF0_SC1_CPU0_S0
ControlEthernetF0_SC1_CPU0_S1
ControlEthernetF1_SC0_CPU0_S0
```

**show controllers backplane ethernet manageability bridge list**

```
ControlEthernetF1_SC0_CPU0_S1
```

**Table 45: show controllers backplane ethernet manageability bridge list Field Descriptions**

| Field       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bridge-name | <p>Displays the name of each bridge in the ControlEthernetrack_slot_module_S0   S1 naming notation where an explanation of each components is as follows:</p> <ul style="list-style-type: none"><li>• <i>rack</i> = Chassis number of the rack.</li><li>• <i>slot</i> = Physical slot number of the card.</li><li>• <i>module</i> = Processor module number is always CPU0.</li><li>• S0   S1 = S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.</li></ul> |

**Related Commands**

| Command       | Description                                                  |
|---------------|--------------------------------------------------------------|
| show platform | Displays information and status for each node in the system. |

# show controllers backplane ethernet manageability bridge port

To display information for a Control Ethernet (CE) bridge port, use the **show controllers backplane ethernet manageability bridge port** command in administration EXEC mode.

{**show controllers backplane ethernet manageability bridge** *bridge-name* **port** *port-number* **basic**| **span-tree**| **transparent**}

## Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>bridge-name</i> | Identifies the bridge whose information you want to display. For the <i>bridge-name</i> argument, use the following naming notation:<br><br>ControlEthernet <i>rack_slot_module</i> _[S0   S1]<br><br>The underscore between values is required as part of the notation. A sample bridge name is ControlEthernet0_RP0_CPU0_S0.<br><br><b>Note</b> To view a list of CE bridges currently in the system, enter the <b>show controllers backplane ethernet manageability bridge list</b> command. |
| <i>port-number</i> | Specify a bridge port number. The range is from 1 to 50.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>basic</b>       | Displays basic information for a bridge port.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>span-tree</b>   | Displays Spanning Tree Protocol (STP) information for a bridge port.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>transparent</b> | Displays transparent bridging information for a bridge port.                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the bridge naming notation (ControlEthernet*rack\_slot\_module*\_[S0 | S1]) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.

- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.

The Cisco CRS system is comprised of multiple bridges. Each route processor (RP) card has one S0 bridge, and each system controller (SC) card has one S0 bridge and one S1 bridge. STP is implemented to avoid bridging loops within the control plane network.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display basic information for port 12 on bridge ControlEthernet0\_RP0\_CPU0\_S0:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 port 12 basic
```

```
Bridge Base Port Information

Bridge Name : ControlEthernet0_RP0_CPU0_S0
Port Id : 12
InterfaceName : ControlEthernet0_RP0_CPU0_S0_12
Circuit : NULL
Delay Discards : 0
MTU Discards : 0

```

**Table 46: show controllers backplane ethernet manageability bridge port basic Field Descriptions**

| Field          | Description                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Name    | Displays the name of the bridge in the ControlEthernetrack_slot_module_[S0   S1] naming notation.                                  |
| Port ID        | Displays the number of the port for which you are displaying information.                                                          |
| Interface Name | Displays the name of the interface associated with the port in the ControlEthernetrack_slot_module_[S0   S1]_port naming notation. |
| Circuit        | Displays a unique name (NULL) for a port that potentially has the same value as another port on the same bridge.                   |

| Field          | Description                                                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delay Discards | Displays the number of frames discarded by the port because of excessive transit delays through the bridge. This counter is incremented by both transparent and source route bridges. |
| MTU Discards   | Displays the number of frames discarded by the port because they are too large. This counter is incremented by both transparent and source route bridges.                             |

The following example shows how to display STP information for port 12 on bridge ControlEthernet0\_RP0\_CPU0\_S0:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 port 12 span-tree
```

```
Bridge stp Port Information

Bridge Name : ControlEthernet0_RP0_CPU0_S0
Port Id : 12
Port Priority : 128
Port State : forwarding(5)
Port Enabled : enabled(1)
Path Cost : 200000
Port Designated Root : 90 01 00 11 93 ef e8 e2
Port Designated Cost : 0
Port Designated Bridge : 90 01 00 11 93 ef e8 e2
Designated Port : 32770
Forward Transport count : 2

```

**Table 47: show controllers backplane ethernet manageability bridge port span-tree Field Descriptions**

| Field         | Description                                                                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Name   | Displays the name of the bridge in the ControlEthernettrack_slot_module_[S0   S1] naming notation.                                                            |
| Port ID       | Displays the number of the port for which you are displaying information.                                                                                     |
| Port Priority | Displays the value of the priority field, which is contained in the first octet (in network byte order) of the Port ID (2 octet long).                        |
| Port State    | Displays the current state of the port as defined by STP. Valid values are disabled(1), blocking(2), listening(3), learning(4), forwarding(5), and broken(6). |
| Port Enabled  | Indicates whether the port is enabled or disabled.                                                                                                            |

| Field                   | Description                                                                                                                                                                                                              |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Path Cost               | Displays the contribution of the port to the cost of paths towards its spanning tree root.                                                                                                                               |
| Port Designated Root    | Displays the unique identifier of the bridge, which is recorded as the root in the bridge protocol data units (BPDUs). The BPDUs are transmitted by the designated bridge for the segment to which the port is attached. |
| Port Designated Cost    | Displays the path cost of the designated port for the segment connected to this port.                                                                                                                                    |
| Port Designated Bridge  | Displays the identifier of the bridge that a port considers to be the designated bridge for the segment connected to this port.                                                                                          |
| Designated Port         | Displays the identifier of the port on the designated bridge for the segment connected to this port.                                                                                                                     |
| Forward Transport Count | Displays the number of times this port has transitioned from the learning to the forwarding states.                                                                                                                      |

The following example shows how to display transparent bridging information for port 12 on bridge ControlEthernet0\_RP0\_CPU0\_S0:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 port 12 transparent
```

```
Bridge tp Port Information

Bridge Name : ControlEthernet0_RP0_CPU0_S0
Port Id : 12
Maximum : 1504
Receive Count : 1
Transmit Count : 123
Received Discards : 0

```

**Table 48: show controllers backplane ethernet manageability bridge port transparent Field Descriptions**

| Field       | Description                                                                                        |
|-------------|----------------------------------------------------------------------------------------------------|
| Bridge Name | Displays the name of the bridge in the ControlEthernettrack_slot_module_[S0   S1] naming notation. |
| Port ID     | Displays the number of the port for which you are displaying information.                          |

| Field             | Description                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------|
| Maximum           | Displays the maximum size, in bytes, of the INFO (non-MAC) field that the port receives or transmits. |
| Receive Count     | Displays the number of frames received by the port from the segment to which it is connected.         |
| Transmit Count    | Displays the number of frames transmitted by the port to the segment to which it is connected.        |
| Received Discards | Displays the number of received valid frames that were discarded.                                     |

**Related Commands**

| Command                                                                                          | Description                                                    |
|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability bridge list</a> , on page 669      | Displays the CE bridges distributed across a Cisco CRS system. |
| <a href="#">show controllers backplane ethernet manageability bridge fdb-entry</a> , on page 663 | Displays the forwarding table entry for a CE bridge port.      |

# show controllers backplane ethernet manageability bridge span-tree

To display Spanning Tree Protocol (STP) information for a Control Ethernet (CE) bridge, use the **show controllers backplane ethernet manageability bridge span-tree** command in administration EXEC mode.

**show controllers backplane ethernet manageability bridge** *bridge-name* **span-tree**

## Syntax Description

*bridge-name* Identifies the bridge whose information you want to display. For the *bridge-name* argument, use the following naming notation:

ControlEthernet*rack\_slot\_module* [S0 | S1]

The underscore between values is required as part of the notation. A sample bridge name is ControlEthernet0\_RP0\_CPU0\_S0.

**Note** To view a list of CE bridges currently in the system, enter the **show controllers backplane ethernet manageability bridge list** command.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the bridge naming notation (ControlEthernet*rack\_slot\_module* [S0 | S1]) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.

The Cisco CRS system is comprised of multiple bridges. Each route processor (RP) card has one S0 bridge, and each system controller (SC) card has one S0 bridge and one S1 bridge. STP is implemented to avoid bridging loops within the control plane network.



**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display STP information for bridge ControlEthernet0\_RP0\_CPU0\_S0:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 span-tree
```

```
Spanning Tree Protocol Information

Bridge Name : ControlEthernet0_RP0_CPU0_S0
STP Version : IEEE8021D
STP Priority : 36864
STP Topology Change : 1793743
STP Topology Change Count: 2
Designated Root : 90 00 00 11 93 ef e8 e2
STP Root Cost : 0
STP Root Port : 0
Maximum Age : 8
Hello Time : 1
STP Hold Time : 1
STP Forward Delay : 6
Bridge Maximum Age : 8
Bridge Hello Time : 1
Bridge Forward Delay : 6

```

**Table 49: show controllers backplane ethernet manageability bridge span-tree Field Descriptions**

| Field                     | Description                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Name               | Displays the name of the bridge in the ControlEthernetrack_slot_module_[S0   S1] naming notation.                                        |
| STP Version               | Displays the STP version that is currently running.                                                                                      |
| STP Priority              | Displays the value of the writable portion of the bridge ID (the first two octets of the bridge ID). The valid range is 0 through 65535. |
| STP Topology Change       | Displays the time, in hundredths of a second, since a topology change was last detected by the bridge.                                   |
| STP Topology Change Count | Displays the number of topology changes detected by the bridge since the management entity was last reset or initialized.                |

| Field                | Description                                                                                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Designated Root      | Displays the bridge identifier of the root of the spanning tree as determined by STP.                                                                                                        |
| STP Root Cost        | Displays the path cost from the bridge to the root.                                                                                                                                          |
| STP Root Port        | Displays the number of the port that offers the lowest cost path from the bridge to the root bridge.                                                                                         |
| Maximum Age          | Displays the maximum age, in hundredths of a second, of STP information learned from the network on any port before it is discarded.                                                         |
| Hello Time           | Displays the time, in hundredths of a second, between the transmission of bridge protocol data units (BPDUs) by any port that is the root of the spanning tree or trying to become the root. |
| STP Hold Time        | Displays the amount of time, in hundredths of a second, that determines the interval during which no more than two BPDUs are transmitted by the node.                                        |
| STP Forward Delay    | Displays a time value, in hundredths of a second, that determines how fast a port changes its spanning state when moving toward the forwarding state.                                        |
| Bridge Maximum Age   | Displays a maximum age value used by all bridges when this bridge is acting as the root.                                                                                                     |
| Bridge Hello Time    | Displays a hello time value used by all bridges when this bridge is acting as the root.                                                                                                      |
| Bridge Forward Delay | Displays a forward delay value used by all bridges when this bridge is acting as the root.                                                                                                   |

**Related Commands**

| Command                                                                                     | Description                                                    |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability bridge list</a> , on page 669 | Displays the CE bridges distributed across a Cisco CRS system. |
| <a href="#">show controllers backplane ethernet manageability bridge port</a> , on page 671 | Displays information for a CE bridge port.                     |

# show controllers backplane ethernet manageability bridge transparent

To display transparent bridging information for a Control Ethernet (CE) bridge, use the **show controllers backplane ethernet manageability bridge transparent** command in administration EXEC mode.

**show controllers backplane ethernet manageability bridge *bridge-name* transparent**

## Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>bridge-name</b> | Identifies the bridge whose information you want to display. For the <i>bridge-name</i> argument, use the following naming notation:<br><br>ControlEthernetrack_slot_module_[S0   S1]<br><br>The underscore between values is required as part of the notation. A sample bridge name is ControlEthernet0_RP0_CPU0_S0.<br><br><b>Note</b> To view a list of CE bridges currently in the system, enter the <b>show controllers backplane ethernet manageability bridge list</b> command. |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the bridge naming notation (ControlEthernetrack\_slot\_module\_[S0 | S1]) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.

Each route processor (RP) card has one S0 bridge, and each system controller (SC) card has one S0 bridge and one S1 bridge.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display transparent bridging information for bridge ControlEthernet0\_RP0\_CPU0\_S0:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability bridge
ControlEthernet0_RP0_CPU0_S0 transparent
```

```
Spanning Tree Protocol Information

Bridge Name : ControlEthernet0_RP0_CPU0_S0
Learned Discards : 0
Aging Time : 300

```

**Table 50: show controllers backplane ethernet manageability bridge transparent Field Descriptions**

| Field            | Description                                                                                                                                                                             |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bridge Name      | Displays the name of the bridge in the ControlEthernettrack_slot_module_[S0   S1] naming notation.                                                                                      |
| Learned Discards | Displays the number of forwarding database entries that were learned or would have been learned but have been discarded because of a storage space shortage in the forwarding database. |
| Aging Time       | Displays the time-out period, in seconds, for aging out dynamically learned forwarding information.                                                                                     |

**Related Commands**

| Command                                                                                     | Description                                                    |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability bridge list</a> , on page 669 | Displays the CE bridges distributed across a Cisco CRS system. |
| <a href="#">show controllers backplane ethernet manageability bridge port</a> , on page 671 | Displays information for a CE bridge port.                     |

# show controllers backplane ethernet manageability interface attributes

To display attribute information for a Control Ethernet (CE) interface, use the **show controllers backplane ethernet manageability interface attributes** command in administration EXEC mode.

**show controllers backplane ethernet manageability interface** *interface-name* **attributes**

## Syntax Description

*interface-name* Identifies the CE interface whose information you want to display. For the *interface-name* argument, use the following naming notation:

ControlEthernetrack/slot/module/[S0 | S1]/port

The slash between values is required as part of the notation. A sample CE interface name is ControlEthernet0/RP0/CPU0/S0/1.

**Note** To view a list of the CE interfaces for a node, enter the **show controllers backplane ethernet manageability interface list** command.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the interface naming notation (ControlEthernetrack/slot/module/[S0 | S1]/port) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack switch, and S1 indicates an inter-rack switch.
- *port*: Physical port number of the interface.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display attribute information for a specified CE interface:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability interface
ControlEthernet0/RP0/CPU0/S0/10 attributes
```

```
Control Ether Interface Attributes

Interface Name : ControlEthernet0_RP0_CPU0_S0_10
Interface Type : Fast Ethernet
Interface Speed : 100000000
Interface High Speed : 100
Admin Status : 1
Oper Status : 1
Connector Present : 0
Physical Address : NA

```

**Table 51: show controllers backplane ethernet manageability interface attributes Field Descriptions**

| Field                | Description                                                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface Name       | Displays the name of the CE interface in the ControlEthernettrack_slot_module_[S0   S1]_port naming notation.                                                             |
| Interface Type       | Displays the type of interface.                                                                                                                                           |
| Interface Speed      | Displays the current bandwidth, in bits per second, of the interface.                                                                                                     |
| Interface High Speed | Displays the current bandwidth, in units of 1,000,000 bits per second, of the interface.                                                                                  |
| Admin Status         | Displays the state of the interface. Valid values are 1 (up), 2 (down), and 3 (testing). While the interface is in a testing state, operational packets cannot be passed. |
| Oper Status          | Displays the current operational state of the interface. Valid values are 1 (up), 2 (down), 3 (testing), 4 (unknown), 5 (dormant), 6 (not present), 7 (lower layer down). |

| Field             | Description                                                                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connector Present | Indicates whether the interface sublayer has a physical connector. Valid values include 0 (a physical connector is present), and 1 (a physical connector is not present). |
| Physical Address  | The address of the interface at its protocol sublayer, if one is present.                                                                                                 |

**Related Commands**

| Command                                                                                        | Description                                  |
|------------------------------------------------------------------------------------------------|----------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability interface list</a> , on page 684 | Displays a list of CE interfaces for a node. |

# show controllers backplane ethernet manageability interface list

To display a list of Control Ethernet (CE) interfaces for a node, use the **show controllers backplane ethernet manageability interface list** command in administration EXEC mode.

**show controllers backplane ethernet manageability interface list** [**location** *node-id*]

## Syntax Description

|                                |                                                                                                                                        |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i> | (Optional) Displays CE interfaces for a specified location. Enter the <i>node-id</i> argument in the <i>rack/slot/module</i> notation. |
| <b>Note</b>                    | Use the <b>show platform</b> command to see a list of all nodes currently in the system.                                               |

## Command Default

No default behavior or values

## Command Default

CE interfaces for the active route processor (RP) are displayed.

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |



## Examples

The following example shows how to display a list of the CE interfaces for the active RP, which in this case includes 18 ports.

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability interface list
```

```
ControlEthernet0/RP0/CPU0
ControlEthernet0/RP0/CPU0/S0/1
ControlEthernet0/RP0/CPU0/S0/2
ControlEthernet0/RP0/CPU0/S0/3
ControlEthernet0/RP0/CPU0/S0/4
ControlEthernet0/RP0/CPU0/S0/5
ControlEthernet0/RP0/CPU0/S0/6
ControlEthernet0/RP0/CPU0/S0/7
ControlEthernet0/RP0/CPU0/S0/8
ControlEthernet0/RP0/CPU0/S0/9
ControlEthernet0/RP0/CPU0/S0/10
ControlEthernet0/RP0/CPU0/S0/11
ControlEthernet0/RP0/CPU0/S0/12
ControlEthernet0/RP0/CPU0/S0/13
ControlEthernet0/RP0/CPU0/S0/14
ControlEthernet0/RP0/CPU0/S0/15
ControlEthernet0/RP0/CPU0/S0/16
ControlEthernet0/RP0/CPU0/S0/49
ControlEthernet0/RP0/CPU0/S0/50
```

The following example shows how to display a list of the CE interfaces for the standby RP, which in this case also includes 18 ports.

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability interface list location 0/RP1/CPU0
```

```
ControlEthernet0/RP1/CPU0
ControlEthernet0/RP1/CPU0/S0/1
ControlEthernet0/RP1/CPU0/S0/2
ControlEthernet0/RP1/CPU0/S0/3
ControlEthernet0/RP1/CPU0/S0/4
ControlEthernet0/RP1/CPU0/S0/5
ControlEthernet0/RP1/CPU0/S0/6
ControlEthernet0/RP1/CPU0/S0/7
ControlEthernet0/RP1/CPU0/S0/8
ControlEthernet0/RP1/CPU0/S0/9
ControlEthernet0/RP1/CPU0/S0/10
ControlEthernet0/RP1/CPU0/S0/11
ControlEthernet0/RP1/CPU0/S0/12
ControlEthernet0/RP1/CPU0/S0/13
ControlEthernet0/RP1/CPU0/S0/14
ControlEthernet0/RP1/CPU0/S0/15
ControlEthernet0/RP1/CPU0/S0/16
ControlEthernet0/RP1/CPU0/S0/49
ControlEthernet0/RP1/CPU0/S0/50
```

**Table 52: show controllers backplane ethernet manageability interface list Field Descriptions**

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| interface-name | <p>Displays the name of each interface in the ControlEthernetrack/slot/module/S0   S1/port naming notation, where an explanation of each components is as follows:</p> <ul style="list-style-type: none"> <li>• <i>rack</i> = Chassis number of the rack.</li> <li>• <i>slot</i> = Physical slot number of the card.</li> <li>• <i>module</i> = Processor module number is always CPU0.</li> <li>• S0   S1 = S0 indicates an intra-rack bridge, and S1 indicates an inter-rack bridge.</li> <li>• <i>port</i>: Physical port number of the interface.</li> </ul> |

**Related Commands**

| Command       | Description                                                  |
|---------------|--------------------------------------------------------------|
| show platform | Displays information and status for each node in the system. |

# show controllers backplane ethernet manageability interface mau-autonet-info

To display medium attachment unit (MAU) auto negotiation information for a Control Ethernet (CE) interface, use the **show controllers backplane ethernet manageability interface mau-autonet-info** command in administration EXEC mode.

**show controllers backplane ethernet manageability interface** *interface-name* **mau-autonet-info**

## Syntax Description

*interface-name* Identifies the CE interface whose information you want to display. For the *interface-name* argument, use the following naming notation:

ControlEthernet*track/slot/module*[S0 | S1]/*port*

The slash between values is required as part of the notation. A sample CE interface name is ControlEthernet0/RP0/CPU0/S0/1.

**Note** To view a list of the CE interfaces for a node, enter the **show controllers backplane ethernet manageability interface list** command.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the interface naming notation (ControlEthernet*track/slot/module*[S0 | S1]/*port*) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack switch, and S1 indicates an inter-rack switch.
- *port*: Physical port number of the interface.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display information about MAU auto negotiation for interface ControlEthernet0/RP0/CPU0/S0/49:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability interface
ControlEthernet0/RP0/CPU0/S0/49 mau-autoneg-info
```

```
Control Ether MAU Auto Neg Information

Interface Name : ControlEthernet0_RP0_CPU0_S0_49
AutoNeg Admin Status : Enabled
AutoNeg Remote Signal : Not Detected
AutoNeg Config : Other
AutoNeg Restart : No Restart
Local Capability Bits : b1000baseXFD
Advertised Capability Bits : b1000baseXFD
Received Capability Bits : b1000baseXFD

```

**Table 53: show controllers backplane ethernet manageability interface mau-autoneg-info Field Descriptions**

| Field                 | Description                                                                                                                                                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface Name        | Displays the name of the CE interface in the ControlEthernettrack_slot_module_[S0   S1]_port naming notation.                                                  |
| AutoNeg Admin Status  | Displays the status of the auto-negotiation function (enabled or disabled).                                                                                    |
| AutoNeg Remote Signal | Indicates whether or not auto-negotiation signaling is detected on the remote end of the link.                                                                 |
| AutoNeg Config        | Indicates the current status of the auto-negotiation process, which can be one of the following: other, configuring, complete, disabled, parallel detect fail. |
| AutoNeg Restart       | Displays whether or not the auto-negotiation function is restarting link negotiation.                                                                          |

| Field                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local Capability Bits      | <p>Displays a value that uniquely identifies the set of capabilities of the local auto-negotiation entity, which can be one of the following:</p> <ul style="list-style-type: none"> <li>• bOther—Other or unknown</li> <li>• b10baseT—10BASE-T half-duplex mode</li> <li>• b10baseTFD—10BASE-T full-duplex mode</li> <li>• b100baseT4—100BASE-T4</li> <li>• b100baseTX—100BASE-TX half-duplex mode</li> <li>• b100baseTXFD—100BASE-TX full-duplex mode</li> <li>• b100baseT2—100BASE-T2 half-duplex mode</li> <li>• b100baseT2FD—100BASE-T2 full-duplex mode</li> <li>• bfdxPause—PAUSE for full-duplex links</li> <li>• bfdxAPause—Asymmetric PAUSE for full-duplex links</li> <li>• bfdxSPause—Symmetric PAUSE for full-duplex links</li> <li>• bfdxBPause—Asymmetric and symmetric PAUSE for full-duplex links</li> <li>• b1000baseX—1000BASE-X, -LX, -SX, -CX half-duplex mode</li> <li>• b1000baseXFD—1000BASE-X, -LX, -SX, -CX full-duplex mode</li> <li>• b1000baseT—1000BASE-T half-duplex mode</li> <li>• b1000baseTFD—1000BASE-T full-duplex mode</li> </ul> |
| Advertised Capability Bits | <p>Displays a value that uniquely identifies the set of capabilities advertised by the local auto-negotiation entity. For a list of valid values, refer to the Local Capability Bits entry in this table.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Received Capability Bits   | <p>Displays a value that uniquely identifies the set of capabilities received from the remote auto-negotiation entity. For a list of valid values, refer to the Local Capability Bits entry in this table.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

**Related Commands**

| Command                                                                                                 | Description                                                                              |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability interface list</a> , on page 684          | Displays a list of CE interfaces for a node.                                             |
| <a href="#">show controllers backplane ethernet manageability interface mau-info</a> , on page 691      | Displays medium attachment unit (MAU) information for a Control Ethernet (CE) interface. |
| <a href="#">show controllers backplane ethernet manageability interface mau-jack-type</a> , on page 697 | Displays the medium attachment unit (MAU) jack type for a CE interface.                  |

# show controllers backplane ethernet manageability interface mau-info

To display medium attachment unit (MAU) information for a Control Ethernet (CE) interface, use the **show controllers backplane ethernet manageability interface mau-info** command in administration EXEC mode.

**show controllers backplane ethernet manageability interface** *interface-name* **mau-info**

## Syntax Description

**interface-name** Identifies the CE interface whose information you want to display. For the *interface-name* argument, use the following naming notation:

ControlEthernetrack/slot/module/[S0 | S1]/port

The slash between values is required as part of the notation. A sample CE interface name is ControlEthernet0/RP0/CPU0/S0/1.

**Note** To view a list of the CE interfaces for a node, enter the **show controllers backplane ethernet manageability interface list** command.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the interface naming notation (ControlEthernetrack/slot/module/[S0 | S1]/port) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack switch, and S1 indicates an inter-rack switch.
- *port*: Physical port number of the interface.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display MAU information for interface ControlEthernet0/RP0/CPU0/S0/10:

```
RP/0/RP0/CPU0:router(admin)#show controllers backplane ethernet manageability interface
ControlEthernet0/RP0/CPU0/S0/10 mau-info
```

```
Control Ether MAU Information

Interface Name : ControlEthernet0_RP0_CPU0_S0_10
MAU Type : dot3MauTypeAUI
MAU Status : Operational
Media Available : Available
Media Avail St Exits : 0
MAU Jabber state : No Jabber
Jabber State Enters : 0
False Carrier Events : 3
MAU DefaultType : dot3MauTypeAUI
Auto Neg Supported : 0
MAU TypeList Bits : bOther
HCFalse Carriers : 3
```

**Table 54: show controllers backplane ethernet manageability interface mau-info Field Descriptions**

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface Name | Displays the name of the CE interface in the ControlEthernettrack_slot_module_[S0   S1]_port naming notation.                                                                                                                                                                                                                                                                                  |
| MAU Type       | Displays the MAU type, which can be one of the following: <ul style="list-style-type: none"> <li>• dot3MauTypeAUI—No internal MAU, view from AUI</li> <li>• dot3MauType100BaseT4—4 pair category 3 UTP</li> <li>• dot3MauType1000BaseLXFD—Fiber over long-wavelength laser, full duplex mode</li> <li>• dot3MauType1000BaseSXFD—Fiber over short-wavelength laser, full duplex mode</li> </ul> |



| Field                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAU Status           | Displays the current state of the MAU. Valid values are other, unknown, operational, standby, shutdown, and reset.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Media Available      | Displays the state of the available MAU, which can be one of the following: <ul style="list-style-type: none"> <li>• Other—The state of the MAU is not one of the other valid values.</li> <li>• Unknown—The state of the MAU is unknown; for example, the MAU is being initialized.</li> <li>• Available—The link, light, or loopback states are normal.</li> <li>• Not Available—The MAU is experiencing link loss or is in a low light or no loopback state.</li> <li>• Remote Fault—A fault is detected at the remote end of the link.</li> </ul> |
| Media Avail St Exits | Displays the number of times that the MAU leaves the Available state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| MAU Jabber State     | Displays the MAU jabber state, which can be one of the following: <ul style="list-style-type: none"> <li>• Other—The jabber state of the MAU is not one of the other valid values.</li> <li>• Unknown—The jabber state of the MAU is unknown; for example, the MAU is being initialized.</li> <li>• No Jabber—The MAU is not jabbering.</li> <li>• Jabbering—The MAU is jabbering.</li> </ul>                                                                                                                                                         |
| Jabber State Enters  | Displays the number of times that the MAU enters the jabbering state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| False Carrier Events | Displays the number of false carrier events during idle in 100BASE-X links (dot3MauType100BaseT4, dot3MauType100BaseTX, dot3MauType100BaseFX, and all 1000Mbps types). For all other MAU types, this counter displays 0.                                                                                                                                                                                                                                                                                                                              |
| MAU Default Type     | Displays the default administrative baseband MAU type to be used in conjunction with the operational MAU type.                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Auto Neg Supported | Indicates whether or not auto negotiation is supported on the MAU. Valid values are 0 (auto negotiation is not supported), and 0 (auto negotiation is supported).                                                                                                                                                                                                                                                                                                                                                                                 |
| MAU Type List Bits | <p>Displays a set of possible IEEE 802.3 types of the MAU, which can be one of the following:</p> <ul style="list-style-type: none"> <li>• bOther—Other or unknown</li> <li>• bAUI—AUI</li> <li>• b10base5—10BASE-5</li> <li>• bFoirl—FOIRL</li> <li>• b10base2—10BASE-2</li> <li>• b10baseT—10BASE-T duplex mode unknown</li> <li>• b10baseFP—10BASE-FP</li> <li>• b10baseFB—10BASE-FB</li> <li>• b10baseFL—10BASE-FL duplex mode unknown</li> <li>• b10broad36—10BROAD36</li> </ul>                                                             |
|                    | <ul style="list-style-type: none"> <li>• b10baseTHD—10BASE-T half duplex mode</li> <li>• b10baseTFD—10BASE-T full duplex mode</li> <li>• b10baseFLHD—10BASE-FL half duplex mode</li> <li>• b10baseFLFD—10BASE-FL full duplex mode</li> <li>• b100baseT4—100BASE-T4</li> <li>• b100baseTXHD—100BASE-TX half duplex mode</li> <li>• b100baseTXFD—100BASE-TX full duplex mode</li> <li>• b100baseFXHD—100BASE-FX half duplex mode</li> <li>• b100baseFXFD—100BASE-FX full duplex mode</li> <li>• b100baseT2HD—100BASE-T2 half duplex mode</li> </ul> |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <ul style="list-style-type: none"> <li>• b100baseT2FD—100BASE-T2 full duplex mode</li> <li>• b1000baseXHD—1000BASE-X half duplex mode</li> <li>• b1000baseXFD—1000BASE-X full duplex mode</li> <li>• b1000baseLXHD—1000BASE-LX half duplex mode</li> <li>• b1000baseLXFD—1000BASE-LX full duplex mode</li> <li>• b1000baseSXHD—1000BASE-SX half duplex mode</li> <li>• b1000baseSXFD—1000BASE-SX full duplex mode</li> <li>• b1000baseCXHD—1000BASE-CX half duplex mode</li> <li>• b1000baseCXFD—1000BASE-CX full duplex mode</li> <li>• b1000baseTHD—1000BASE-T half duplex mode</li> </ul> |
|       | <ul style="list-style-type: none"> <li>• b1000baseTFD—1000BASE-T full duplex mode</li> <li>• b10GbaseX—10GBASE-X</li> <li>• b10GbaseLX4—10GBASE-LX4</li> <li>• b10GbaseR—10GBASE-R</li> <li>• b10GbaseER—10GBASE-ER</li> <li>• b10GbaseLR—10GBASE-LR</li> <li>• b10GbaseSR—10GBASE-SR</li> <li>• b10GbaseW—10GBASE-W</li> <li>• b10GbaseEW—10GBASE-EW</li> <li>• b10GbaseLW—10GBASE-LW</li> <li>• b10GbaseSW—10GBASE-SW</li> </ul>                                                                                                                                                           |

 show controllers backplane ethernet manageability interface mau-info

| Field             | Description                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| HC False Carriers | Displays the number of false carrier events during idle in 100BASE-X and 1000BASE-X links. For all other MAU types, this counter displays 0. |

**Related Commands**

| Command                                                                                                    | Description                                                                            |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability interface list</a> , on page 684             | Displays a list of CE interfaces for a node.                                           |
| <a href="#">show controllers backplane ethernet manageability interface mau-autonet-info</a> , on page 687 | Displays medium attachment unit (MAU) auto negotiation information for a CE interface. |
| <a href="#">show controllers backplane ethernet manageability interface mau-jack-type</a> , on page 697    | Displays the medium attachment unit (MAU) jack type for a CE interface.                |

# show controllers backplane ethernet manageability interface mau-jack-type

To display the medium attachment unit (MAU) jack type for a Control Ethernet (CE) interface, use the **show controllers backplane ethernet manageability interface mau-jack-type** command in administration EXEC mode.

**show controllers backplane ethernet manageability interface** *interface-name* **mau-jack-type**

## Syntax Description

*interface-name* Identifies the CE interface whose information you want to display. For the *interface-name* argument, use the following naming notation:

ControlEthernet*rack/slot/module*[S0 | S1]/*port*

The slash between values is required as part of the notation. A sample CE interface name is ControlEthernet0/RP0/CPU0/S0/1.

**Note** To view a list of the CE interfaces for a node, enter the **show controllers backplane ethernet manageability interface list** command.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the interface naming notation (ControlEthernet*rack/slot/module*[S0 | S1]/*port*) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack switch, and S1 indicates an inter-rack switch.
- *port*: Physical port number of the interface.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display the MAU jack type for interface ControlEthernet0/RP0/CPU0/S0/10:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability interface
ControlEthernet0/RP0/CPU0/S0/10 mau-jack-type
```

```
Control Ether MAU Jack Type

Interface Name : ControlEthernet0_RP0_CPU0_S0_10
MAU Jack Type : undefined or unknown
```

**Table 55: show controllers backplane ethernet manageability interface mau-jack-type Field Descriptions**

| Field          | Description                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------|
| Interface Name | Displays the name of the interface in the ControlEthernetrack_slot_module_[S0   S1]_port naming notation. |
| MAU Jack Type  | Displays the jack connector type, which can be undefined or unknown.                                      |

**Related Commands**

| Command                                                                                                    | Description                                                                              |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability interface list</a> , on page 684             | Displays a list of CE interfaces for a node.                                             |
| <a href="#">show controllers backplane ethernet manageability interface mau-autonet-info</a> , on page 687 | Displays medium attachment unit (MAU) auto negotiation information for a CE interface.   |
| <a href="#">show controllers backplane ethernet manageability interface mau-info</a> , on page 691         | Displays medium attachment unit (MAU) information for a Control Ethernet (CE) interface. |

# show controllers backplane ethernet manageability interface statistics

To display statistics for a Control Ethernet (CE) interface, use the **show controllers backplane ethernet manageability interface statistics** command in administration EXEC mode.

**show controllers backplane ethernet manageability interface** *interface-name* **statistics**

## Syntax Description

*interface-name* Identifies the CE interface whose information you want to display. For the *interface-name* argument, use the following naming notation:

ControlEthernet *rack/slot/module/*[S0 | S1]/ *port*

The slash between values is required as part of the notation. A sample CE interface name is ControlEthernet0/RP0/CPU0/S0/1.

**Note** To view a list of the CE interfaces for a node, enter the **show controllers backplane ethernet manageability interface list** command.

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An explanation of each component of the interface naming notation (ControlEthernet*rack/slot/module/*[S0 | S1]/*port*) is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the card.
- *module*: Processor module number is always CPU0.
- [S0 | S1]: S0 indicates an intra-rack switch, and S1 indicates an inter-rack switch.
- *port*: Physical port number of the interface.

**show controllers backplane ethernet manageability interface statistics****Task ID**

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

**Examples**

The following example shows how to display statistics for interface ControlEthernet0/RP0/CPU0/S0/1:

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet manageability interface
ControlEthernet0/RP0/CPU0/S0/1 statistics
```

```
Control Ether Interface Counters

Interface Name : ControlEthernet0_RP0_CPU0_S0_1
ifInOctets : 16168240550
ifInUcastPkts : 103181424
ifInMulticastPkts : 5821166
ifInBroadcastPkts : 1465909
ifInDiscards : 0
ifInErrors : 0
ifInUnknownProtos : 0
ifOutOctets : 14871704758
ifOutUcastPkts : 104085365
ifOutMulticastPkts : 30884564
ifOutBroadcastPkts : 19
ifOutDiscards : 0
ifOutErrors : 0
ifDiscontinuityTime : 0

```

**Table 56: show controllers backplane ethernet manageability interface statistics Field Descriptions**

| Field             | Description                                                                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface Name    | Displays the name of the CE interface in the ControlEthernettrack_slot_module_[S0   S1]_port naming notation.                                                           |
| ifInOctets        | Displays the total number of octets received on the interface, including framing characters.                                                                            |
| ifInUcastPkts     | Displays the number of packets that were not addressed to a multicast or broadcast address at this (sub-)layer but were delivered by the sublayer to a higher sublayer. |
| ifInMulticastPkts | Displays the number of packets that were addressed to a multicast address at this sublayer and were delivered by the sublayer to a higher (sub-)layer.                  |



| Field              | Description                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ifInBroadcastPkts  | Displays the number of packets that were addressed to a broadcast address at this sublayer and were delivered by the sublayer to a higher (sub-)layer.                                                                          |
| ifInDiscards       | Displays the number of inbound packets that were discarded even though no errors that would prevent their delivery to a higher-layer protocol were detected.                                                                    |
| ifInErrors         | Displays the number of inbound packets or transmission units that contained errors, which prevented them from being delivered to a higher-layer protocol.                                                                       |
| ifInUnknownProtos  | Displays the number of received packets or transmission units that were discarded because of an unknown or unsupported protocol. If the interface that does not support protocol multiplexing, this field displays 0.           |
| ifOutOctets        | Displays the total number of octets, including framing characters, transmitted out of the interface.                                                                                                                            |
| ifOutUcastPkts     | Displays the total number of packets that were not addressed to a multicast or broadcast address at this sublayer, including packets that were discarded or not sent, and that higher-level protocols requested be transmitted. |
| ifOutMulticastPkts | Displays the total number of packets that were addressed to a multicast or broadcast address at this sublayer, including packets that were discarded or not sent, and that higher-level protocols requested be transmitted.     |
| ifOutBroadcastPkts | Displays the total number of packets that were addressed to a broadcast address at this sublayer, including packets that were discarded or not sent, and that higher-level protocols requested be transmitted.                  |
| ifOutDiscards      | Displays the number of outbound packets that were discarded even though no errors that might prevent their transmission was detected.                                                                                           |
| ifOutErrors        | Displays the number of outbound packets or transmission units that were not transmitted because of errors.                                                                                                                      |

 show controllers backplane ethernet manageability interface statistics

| Field               | Description                                                                                                                                                                                                                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ifDiscontinuityTime | Displays the number of times that the interface experienced a discontinuity, which is when an interface is reset and its counter values are retained and not incremented until the interface is up again. If no discontinuities have occurred since the last re-initialization of the local management subsystem, then this field displays 0. |

**Related Commands**

| Command                                                                                        | Description                                  |
|------------------------------------------------------------------------------------------------|----------------------------------------------|
| <a href="#">show controllers backplane ethernet manageability interface list</a> , on page 684 | Displays a list of CE interfaces for a node. |

# show controllers backplane ethernet multicast groups

To display information about backplane interfaces that are in multicast groups in a particular location, use the **show controllers backplane ethernet multicast groups** command in administration EXEC mode.

**show controllers backplane ethernet multicast groups location** *node-id*

## Syntax Description

|                                |                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i> | Displays backplane information for multicast groups for a specified location.            |
| <b>Note</b>                    | Use the <b>show platform</b> command to see a list of all nodes currently in the system. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                                                                                                                                                                                      |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.3.0 | This command was introduced. This command replaces the <b>show controllers backplane ethernet local multicast groups</b> and <b>show controllers backplane ethernet location brief multicast groups</b> commands. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID | Operations |
|---------|------------|
| fabric  | read       |
| system  | read       |

## Examples

The following example shows the output from the **show controllers backplane ethernet multicast groups** command, which displays a summary of information for the backplane interfaces.

```
RP/0/RP0/CPU0:router(admin)# show controllers backplane ethernet multicast groups location 0/1/cpu0
```

**show controllers backplane ethernet multicast groups**

| Intf<br>Name         | Multicast<br>address | Client registered for this address |      |
|----------------------|----------------------|------------------------------------|------|
|                      |                      | Id                                 | Name |
| FastEthernet0_2_CPU0 | 0100.0000.0064       | 2                                  | GSP  |
|                      | 0100.0000.0065       | 2                                  | GSP  |
|                      | 0100.0000.0066       | 2                                  | GSP  |
|                      | 0100.0000.0068       | 2                                  | GSP  |
|                      | 0100.0000.006a       | 2                                  | GSP  |
|                      | 0100.0000.006c       | 2                                  | GSP  |
|                      | 0100.0000.006e       | 2                                  | GSP  |
|                      | 0100.0000.0071       | 2                                  | GSP  |
|                      | 0100.0000.2774       | 2                                  | GSP  |
|                      | 0100.0000.2775       | 2                                  | GSP  |
|                      | 0100.0000.2776       | 2                                  | GSP  |
|                      | 0100.0000.2778       | 2                                  | GSP  |
|                      | 0100.0000.277a       | 2                                  | GSP  |
|                      | 0100.0000.2782       | 2                                  | GSP  |
|                      | 0100.0000.278a       | 2                                  | GSP  |
|                      | 0100.0000.2796       | 2                                  | GSP  |
|                      | 0100.0000.2798       | 2                                  | GSP  |

**Table 57: show controllers backplane ethernet multicast groups Field Description**

| Field             | Description                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intf Name         | Identifies the interface whose multicast addresses are displayed.<br><br><b>Note</b> A multicast address is a single address that refers to multiple network devices. |
| Multicast address | Multicast addresses associated with the specified interface.<br><br><b>Note</b> A multicast address is a single address that refers to multiple network devices.      |
| ID                | Client identifier.                                                                                                                                                    |
| Name              | Client application name.                                                                                                                                              |

**Related Commands**

| Command                                                                                   | Description                                                                              |
|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet brief</a> , on <a href="#">page 649</a>   | Displays brief information about backplane Ethernet interfaces in a particular location. |
| <a href="#">show controllers backplane ethernet clients</a> , on <a href="#">page 651</a> | Displays information about client applications in a particular location.                 |
| <a href="#">show controllers backplane ethernet detail</a> , on <a href="#">page 656</a>  | Displays detailed information about the backplane interfaces in a particular location.   |

# show controllers switch ports

To display status on a switch port, use the **show controllers switch ports** command in administration EXEC mode.

**show controllers switch** {0|1} **ports** [**FE** *port-id*] [**GE** *port-id*] **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                            |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0   1</b>                   | Identifies the instance of the controller.                                                                                                                                 |
| <b>FE</b> <i>port-id</i>       | (Optional) Identifies the Fast Ethernet (FE) port for which to display information. Range is from 0 through 15.                                                            |
| <b>GE</b> <i>port-id</i>       | (Optional) Identifies the Gigabit Ethernet (GE) port for which to display information. Range is from 0 through 1.                                                          |
| <b>location</b> <i>node-id</i> | Displays the status of the switch port for the specified location.<br><b>Note</b> Use the <b>show platform</b> command to see a list of all nodes currently in the system. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

**Examples**

The following example shows the output from the **show controllers switch ports** command, which displays status about all switch controller ports on switch 0:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch 0 ports location 0/RP0/CPU0

Switch Instance 0:
FE Port 0 : Up, STP State : FORWARDING (Connects to - 0/RP0)
FE Port 1 : Up, STP State : FORWARDING (Connects to - 0/RP1)
FE Port 2 : Up, STP State : FORWARDING (Connects to - 0/SM0)
FE Port 3 : Up, STP State : FORWARDING (Connects to - 0/SM1)
FE Port 4 : Up, STP State : FORWARDING (Connects to - 0/SM2)
FE Port 5 : Up, STP State : FORWARDING (Connects to - 0/SM3)
FE Port 6 : Down (Connects to -)
FE Port 7 : Down (Connects to -)
FE Port 8 : Down (Connects to - 0/LC0)
FE Port 9 : Up, STP State : FORWARDING (Connects to - 0/LC1)
FE Port 10 : Down (Connects to - 0/LC2)
FE Port 11 : Down (Connects to - 0/LC3)
FE Port 12 : Up, STP State : FORWARDING (Connects to - 0/LC4)
FE Port 13 : Down (Connects to - 0/LC5)
FE Port 14 : Up, STP State : FORWARDING (Connects to - 0/LC6)
FE Port 15 : Down (Connects to - 0/LC7)
GE Port 0 : Down (Connects to - GE_0)
GE Port 1 : Down (Connects to - GE_1)
```

The following example shows the output from the **show controllers switch ports** command, which displays status about switch controller Fast Ethernet port 15 on switch 0:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch 0 ports FE 14 location 0/RP0/CPU0

Switch Instance 0:
FE Port 14 : Up, STP State : FORWARDING (Connects to - 0/LC6)
```

This table describes the significant fields shown in the displays.

**Table 58: show controllers switch ports Field Descriptions**

| Field        | Description                                                      |
|--------------|------------------------------------------------------------------|
| FE Port      | Identifies the FE port.                                          |
| GE Port      | Identifies the GE port.                                          |
| Port State   | The administrative state of the port: Up or Down.                |
| STP State    | The state of the Spanning-Tree Protocol: FORWARDING or DISABLED. |
| Connected to | The node that owns the specified port.                           |

**Related Commands**

| Command                                                          | Description                                                 |
|------------------------------------------------------------------|-------------------------------------------------------------|
| <a href="#">show controllers switch statistics</a> , on page 707 | Displays statistics on all ports on the switch controllers. |

# show controllers switch statistics

To display statistics on all ports on the switch controllers, use the **show controllers switch statistics** command in administration EXEC mode.

**show controllers switch** {0|1} **statistics** [FE *port-id*] GE *port-id* **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                          |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0   1</b>                   | Instance of the controller.                                                                                                                                              |
| <b>FE</b> <i>port-id</i>       | (Optional) Identifies the Fast Ethernet (FE) port for which to display information. Range is from 0 through 15.                                                          |
| <b>GE</b> <i>port-id</i>       | (Optional) Identifies the Gigabit Ethernet (GE) port for which to display information. Range is from 0 through 1.                                                        |
| <b>location</b> <i>node-id</i> | Displays the status of the switch port for a specified location.<br><b>Note</b> Use the <b>show platform</b> command to see a list of all nodes currently in the system. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

The following example shows the output from the **show controllers switch statistics** command, which displays switch controller statistics for all ports:

```
Switch Instance 0:
Port Tx Frames Tx Errors Rx Frames Rx Errors Connects

0 : 567377 0 688743 0 0/RP0
1 : 430355 0 327880 0 0/RP1
2 : 338924 0 23826 2 0/SM0
3 : 338267 0 23098 2 0/SM1
4 : 338812 0 23839 2 0/SM2
5 : 338225 0 23025 2 0/SM3
6 : 1 0 0 0
7 : 1 0 0 0
8 : 1 0 0 0 0/LC0
9 : 508064 0 122043 2 0/LC1
10 : 1 0 0 0 0/LC2
11 : 130 0 0 0 0/LC3
12 : 427887 0 183726 2 0/LC4
13 : 1 0 0 0 0/LC5
14 : 509105 0 125008 2 0/LC6
15 : 1 0 0 0 0/LC7
24 : 0 0 0 0 GE_0
25 : 0 0 0 0 GE_1
@@FFP counters @@

counter[ffpcnt_i]: 0x0
```

| Port | Tx Frames | Tx Errors | Rx Frames | Rx Errors | Connects |
|------|-----------|-----------|-----------|-----------|----------|
| 0 :  | 624465    | 0         | 736355    | 0         | 0/RP0    |

Cisco IOS XR Interface and Hardware Component Command Reference for the Cisco CRS Router



**Table 59: show controllers switch statistics Field Descriptions**

| Field     | Description                                            |
|-----------|--------------------------------------------------------|
| Port      | Number of switch port.                                 |
| Tx Frames | Number of packets transmitted from the switch port.    |
| Tx Errors | Number of transmission errors.                         |
| Rx Frames | Number of packets received on the switch port.         |
| Rx Errors | Number of receive errors.                              |
| Connects  | Location of peer side to which this port is connected. |

**Related Commands**

| Command                                                     | Description                       |
|-------------------------------------------------------------|-----------------------------------|
| <a href="#">show controllers switch ports</a> , on page 705 | Displays status on a switch port. |

# show spantree

To display spanning tree configuration information, enter the **show spantree** command in administration EXEC mode.

**show spantree** {**mst 1** {**brief**|**detail**|**port** {**FE** *port-id*|**GE** *port-id*}}|**mst config**} **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                                                               |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>mst 1</b>                   | Shows Multiple Spanning Tree (MST) information for instance 1.                                                                                                                                                |
| <b>brief</b>                   | Displays a summary of spanning tree information.                                                                                                                                                              |
| <b>detail</b>                  | Displays detailed spanning tree information.                                                                                                                                                                  |
| <b>port</b>                    | Displays spanning tree information for a specific Spanning Tree Protocol (STP) port. Replace the <i>port-id</i> argument with the number that identifies the port you want to display. Range is 1 through 49. |
| <b>FE</b> <i>port-id</i>       | Identifies the FE port for which to display information. Valid values are 0 or 1.                                                                                                                             |
| <b>GE</b> <i>port-id</i>       | Identifies the GE port for which to display information. Valid values are 0 or 1.                                                                                                                             |
| <b>mst config</b>              | Shows MST configuration information.                                                                                                                                                                          |
| <b>location</b> <i>node-id</i> | Displays spanning tree information for the specified location.<br><b>Note</b> Use the <b>show platform</b> command to see a list of all nodes currently in the system.                                        |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Enter the **location** *node-id* argument in the *rack/slot/module* notation.

**Task ID**

| Task ID     | Operations |
|-------------|------------|
| root-system | read       |
| system      | read       |

**Examples**

The following example shows how to display MST information for instance 1 at the specified location:

```
RP/0/RP0/CPU0:router(admin)# show spantree mst 1 brief location 0/RP0/CPU0
```

```
MST 0 vlans mapped: 2-4094
Bridge address 0011.93ef.e8e2 priority 36864 (36864 sysid 0)
Root this switch for the CIST
Operational hello time 1, forward delay 6, max age 8, txholdcount 6
Configured hello time 1, forward delay 6, max age 8, max hops 4

Interface Sts Role Cost Prio.Nbr Type

MST 1 vlans mapped: 1
Bridge address 0011.93ef.e8e2 priority 36865 (36864 sysid 1)
Root this switch for MST1

Interface Sts Role Cost Prio.Nbr Type

FE_Port_1 FWD Desg 200000 128. 2 P2p
```

**Table 60: show spantree mst 1 brief Field Descriptions**

| Field             | Description                                                                                                                                                                       |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MST <i>number</i> | Number of STP MST.                                                                                                                                                                |
| vlans mapped      | VLAN numbers mapped to the MST.                                                                                                                                                   |
| Bridge address    | MAC address of the bridge.                                                                                                                                                        |
| Bridge priority   | STP priority of the bridge.                                                                                                                                                       |
| Root              | MAC address of the root bridge.                                                                                                                                                   |
| Operational       | Operational values of the following parameters: <ul style="list-style-type: none"> <li>• hello time</li> <li>• forward delay</li> <li>• max age</li> <li>• txholdcount</li> </ul> |

| Field      | Description                                                                                                                                                                   |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configured | Configured values of the following parameters: <ul style="list-style-type: none"> <li>• hello time</li> <li>• forward delay</li> <li>• max age</li> <li>• max hops</li> </ul> |
| Interface  | Interfaces present in the STP.                                                                                                                                                |
| Sts        | Spanning tree status.                                                                                                                                                         |
| Role       | Spanning tree role.                                                                                                                                                           |
| Cost       | Spanning tree cost.                                                                                                                                                           |
| Prio. Nbr  | Spanning tree priority.                                                                                                                                                       |
| Type       | Type of link.                                                                                                                                                                 |

The following example shows how to display MST information for a specified FE port at a specified location:

```
RP/0/RP0/CPU0:router(admin)# show spantree mst 1 port FE 1 location 0/RP0/CPU0
```

```
FE_Port_1 of MST1 is designated forwarding
Edge port: no (default) port guard : loop (default)
Link type: point-to-point (auto) bpdu filter: disable (default)
Boundary : internal bpdu guard : disable (default)
Bpdus (MRecords) sent 6122, received 3
```

```
Instance Role Sts Cost Prio.Nbr Vlans mapped

1 Desg FWD 200000 128. 2 1
```

**Table 61: show spantree mst 1 port Field Descriptions**

| Field                                                 | Description                                                        |
|-------------------------------------------------------|--------------------------------------------------------------------|
| <i>port-type</i> Port number of MST1 is <i>status</i> | Spanning tree status of indicated port.                            |
| Edge port                                             | Indicates whether or not the port is an edge port.                 |
| (default) port guard                                  | Indicates that the loop port guard feature is on.                  |
| Link type                                             | Port type, which can be point-to-point or point-to-multipoint.     |
| (auto) bpdu filter                                    | Indicates that the bridge protocol data unit (BPDU) filter is off. |

| Field                     | Description                                   |
|---------------------------|-----------------------------------------------|
| Boundary                  | Type of boundary.                             |
| bpdguard                  | Indicates that the BPDU guard feature is off. |
| Bpdus (MRecords) sent     | Number of BPDU records sent.                  |
| Bpdus (MRecords) received | Number of BPDU records received.              |
| Instance                  | Number of instances.                          |
| Role                      | STP role of the port.                         |
| Sts                       | Spanning tree status of the port.             |
| Cost                      | Spanning tree cost of the port.               |
| Prio. Nbr                 | Spanning tree priority of the port.           |
| Vlans mapped              | VLAN numbers that are mapped to the port.     |

The following example shows how to display MST configuration information for the specified location:

```
RP/0/RP0/CPU0:router(admin)# show spantree mst config location 0/RP0/CPU0
```

```
Name [STP_1]
Revision 1
Instances configured 2
```

```

0 2-4094
1 1

```

**Table 62: show spantree mst config Field Descriptions**

| Field                | Description                                            |
|----------------------|--------------------------------------------------------|
| Name                 | Identifies the MST for which information is displayed. |
| Revision             | Revision of the current MST configuration.             |
| Instances configured | Number of configured MST instances.                    |
| 01                   | Identifier of the displayed instances.                 |
| 2-4094q              | VLANs that are mapped to the displayed MST.            |

 show spantree



# Inter-rack Switch Control Network Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring inter-rack switch control on the Cisco CRS Router.

- [clear controller switch, page 716](#)
- [clear controller switch errdisable, page 718](#)
- [clear controller switch inter-rack, page 720](#)
- [show controllers switch, page 722](#)
- [show controllers switch inter-rack ports, page 724](#)
- [show controllers switch inter-rack statistics, page 726](#)
- [show controllers switch inter-rack stp, page 730](#)
- [show controllers switch inter-rack udld, page 732](#)
- [show controllers switch stp location, page 734](#)
- [show controllers switch stp ports, page 737](#)
- [show controllers switch stp region, page 739](#)
- [show controllers switch udld location, page 741](#)
- [show controllers switch udld ports, page 743](#)

# clear controller switch

To clear the statistics for the Broadcom switches for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card, use the **clear controller switch** command in administration EXEC mode.

**clear controller switch** *instance* **statistics** {**all** *location node-id* | *location node-id*} **ports** *number* *location node-id*}

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>instance</i>                | Switch instance identifier. The switch number is either 0 or 1.                                                                                                                                         |
| <b>statistics</b>              | Clears statistics for packets transmitted/received on switch ports.                                                                                                                                     |
| <b>all</b>                     | Clears statistics for all ports.                                                                                                                                                                        |
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |
| <b>ports</b> <i>number</i>     | Clears statistics for a specific switch port.                                                                                                                                                           |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                             |
|---------------|----------------------------------------------------------|
| Release 3.4.1 | This command was updated to include inter-rack switches. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **clear controller switch** command is used to specify intra-rack switches.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| root-system | execute    |



## Examples

The following example shows how to clear the statistics for the Broadcom switches:

```
RP/0/0/CPU0:router(admin)# clear controller switch 1 statistics all location f0/sc0/cpu0
```

# clear controller switch errdisable

To clear the err-disable state of the switch port for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card, use the **clear controller switch errdisable** command in administration EXEC mode.

**clear controller switch errdisable port {FE| GE} {0| 1} location *node-id***

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>port</b>                    | Specifies the port.                                                                                                                                                                                     |
| <b>FE</b>                      | Specifies the ports for the Fast Ethernet (FE).                                                                                                                                                         |
| <b>GE</b>                      | Specifies the ports for the Gigabit Ethernet (GE).                                                                                                                                                      |
| <b>0</b>                       | Specifies port number 0 for the backplane FE.                                                                                                                                                           |
| <b>1</b>                       | Specifies port number 1 for the backplane FE.                                                                                                                                                           |
| <b>location <i>node-id</i></b> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                                             |
|---------------|----------------------------------------------------------|
| Release 3.4.1 | This command was updated to include inter-rack switches. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| root-system | execute    |

## Examples

The following example shows how to clear the error disable state for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```
RP/0/RP0/CPU0:router(admin)## clear controller switch errdisable port GE 1 location f0/sc0/cpu0
```

# clear controller switch inter-rack

To clear the ISC switch counters, use the **clear controller switch inter-rack** command in administration EXEC mode.

**clear controller switch inter-rack errdisable** {**ports** {**all**|*number*}|**statistics** {**all** | {**ports**|*number*}} **location** *node-id*}

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>errdisable</b>              | Clears the err-disabled state of the port if the port was brought down by Unidirectional Link Detection (UDLD).                                                                                         |
| <b>ports</b>                   | Specifies the port.                                                                                                                                                                                     |
| <b>number</b>                  | Number for the port. The range is from 0 to 21.                                                                                                                                                         |
| <b>all</b>                     | Specifies all ports for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card.                                                                                                              |
| <b>statistics</b>              | Clears the statistics for the switch.                                                                                                                                                                   |
| <b>all</b>                     | Specifies all of the ports.                                                                                                                                                                             |
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **clear controller switch inter-rack** command is used to specify inter-rack switches.

**Task ID**

| Task ID     | Operations |
|-------------|------------|
| root-system | execute    |

**Examples**

The following example shows how to clear statistics for all the ports for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```
RP/0/RP0/CPU0:router(admin)# clear controller switch inter-rack statistics all location f0/sc0/cpu0
```

# show controllers switch

To display the control Ethernet connection in the route processor (RP), use the **show controllers switch** command in administration EXEC mode.

**show controllers switch** *instance* {**ports**|**statistics**} **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>instance</i>                | Two intra-rack switches are present on the RP/SC. The instance is from 0 to 1 that identifies the specific switch.                                                                                      |
| <b>ports</b>                   | Displays the port states as up, down, or err-disabled. The <b>ports</b> keyword displays control Ethernet switches, port states, statistics, and Spanning Tree Protocol (STP) information.              |
| <b>statistics</b>              | Displays switch port statistics.                                                                                                                                                                        |
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **show controllers switch** command is used to specify intra-rack switches.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

## Examples

The following sample output shows how to verify the control Ethernet connection on the RP:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch 0 ports location 0/rp0/Cpu0

FE Port 0 : Up, STP State : FORWARDING (Connects to - 0/RP0)
FE Port 1 : Up, STP State : FORWARDING (Connects to - 0/RP1)
FE Port 2 : Down (Connects to - 0/FC0)
FE Port 3 : Down (Connects to - 0/FC1)
FE Port 4 : Down (Connects to - 0/AM0)
FE Port 5 : Down (Connects to - 0/AM1)
FE Port 6 : Down (Connects to -)
FE Port 7 : Down (Connects to -)
FE Port 8 : Down (Connects to - 0/SM0)
FE Port 9 : Up, STP State : FORWARDING (Connects to - 0/SM1)
FE Port 10 : Down (Connects to - 0/SM2)
FE Port 11 : Down (Connects to - 0/SM3)
FE Port 12 : Down (Connects to - 0/SM4)
FE Port 13 : Down (Connects to - 0/SM5)
FE Port 14 : Down (Connects to - 0/SM6)
FE Port 15 : Down (Connects to - 0/SM7)
GE Port 0 : Up, STP State : FORWARDING (Connects to - GE_0)
GE Port 1 : Up, STP State : FORWARDING (Connects to - Switch 1)
```

The following sample output shows how to verify the control Ethernet connection on intra-rack switches for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch 0 ports location f0/sc0/Cpu0

FE Port 0 : Up, STP State : FORWARDING (Connects to - F0/SC0)
FE Port 1 : Up, STP State : FORWARDING (Connects to - F0/SC1)
FE Port 2 : Down (Connects to - F0/FC0)
FE Port 3 : Down (Connects to - F0/FC1)
FE Port 4 : Down (Connects to - F0/AM0)
FE Port 5 : Down (Connects to - F0/AM1)
FE Port 6 : Down (Connects to - F0/LM0)
FE Port 7 : Down (Connects to - F0/LM1)
FE Port 8 : Down (Connects to - F0/SM0)
FE Port 9 : Down (Connects to - F0/SM1)
FE Port 10 : Down (Connects to - F0/SM2)
FE Port 11 : Down (Connects to - F0/SM3)
FE Port 12 : Down (Connects to - F0/SM4)
FE Port 13 : Down (Connects to - F0/SM5)
FE Port 14 : Down (Connects to - F0/SM6)
FE Port 15 : Down (Connects to - F0/SM7)
GE Port 0 : Up, STP State : FORWARDING (Connects to - GE_0)
GE Port 1 : Up, STP State : FORWARDING (Connects to - Switch 1)
```

**Table 63: show controllers switch Field Descriptions**

| Field     | Description                                     |
|-----------|-------------------------------------------------|
| FE Port   | Fast Ethernet (FE) port.                        |
| STP State | Spanning Tree Protocol (STP) state of the port. |
| GE Port   | Gigabit Ethernet (GE) port.                     |

# show controllers switch inter-rack ports

To display the inter-rack switch port states for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card, use the **show controllers switch inter-rack ports** command in administration EXEC mode.

**show controllers switch inter-rack ports all location *node-id***

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>all</b>                     | Displays all the ports for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card.                                                                                                           |
| <b>location <i>node-id</i></b> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The port numbers, which range from 0 to 21, correspond to those on the front panel.



### Note

The **show controllers switch inter-rack ports** command is applied only to the 22-port SCGE. When you use the **all** and **location** keywords, all other supported cards are displayed including the route processor (RP).

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |
| admin       | read       |



## Examples

The following example shows sample output of the control Ethernet connection for inter-rack switches on the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch inter-rack ports all location f0/sc0/CPU0
```

```
GE_Port_0 : Down
GE_Port_1 : Down
...
GE_Port_13 : Up
GE_Port_14 : Up
...
GE_Port_20 : Down
GE_Port_21 : Down
To_5618 : Up
Stacking : Up
```

## show controllers switch inter-rack statistics

To display the statistics on the ports of the inter-rack switches for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card, use the **show controllers switch inter-rack statistics** command in administration EXEC mode.

**show controllers switch inter-rack statistics** [*interface number*] **all** {**brief**|**detail**} **location** *node-id*

### Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface number</i>        | Number for the Gigabit Ethernet interface. The range is from 0 to 21. The interface number identifies the specific front panel GE port on the 22-port SCGE.                                             |
| <b>all</b>                     | Displays statistics of all ports for inter-rack switches.                                                                                                                                               |
| <b>brief</b>                   | Displays transmit and receive statistics on the GE ports.                                                                                                                                               |
| <b>detail</b>                  | Displays MIB like detailed switch port statistics that include transmit, receive, and error packet counts.                                                                                              |
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

### Command Default

No default behavior or values

### Command Modes

Administration EXEC

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

| Task ID | Operations |
|---------|------------|
| admin   | read       |

## Examples

The following example shows sample output on the port statistics counters for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch inter-rack statistics all brief location
f0/sc0/cpu0
```

| Port         | Tx Frames | Tx Errors | Rx Frames | Rx Errors |
|--------------|-----------|-----------|-----------|-----------|
| GE_Port_0 :  | 374423    | 0         | 1776848   | 0         |
| GE_Port_1 :  | 251232    | 0         | 170742    | 0         |
| GE_Port_2 :  | 857923    | 0         | 414409    | 0         |
| GE_Port_3 :  | 239437    | 0         | 152772    | 0         |
| GE_Port_4 :  | 166166    | 0         | 82031     | 0         |
| GE_Port_5 :  | 0         | 0         | 0         | 0         |
| GE_Port_6 :  | 0         | 0         | 0         | 0         |
| ...          |           |           |           |           |
| GE_Port_16 : | 0         | 0         | 0         | 0         |
| GE_Port_17 : | 0         | 0         | 0         | 0         |
| GE_Port_18 : | 0         | 0         | 0         | 0         |
| GE_Port_19 : | 0         | 0         | 0         | 0         |
| GE_Port_20 : | 0         | 0         | 0         | 0         |
| GE_Port_21 : | 0         | 0         | 0         | 0         |
| To_5618 :    | 522072    | 0         | 293720    | 0         |
| Stacking :   | 1482      | 0         | 0         | 0         |
| Stacking :   | 0         | 0         | 0         | 0         |

The following example shows sample output for the detailed statistics per port for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch inter-rack statistics 0 detail location
f0/sc0/cpu0
```

```
GE_Port_0

Rx fragment : 0 Tx fragment : 0
Rx unicast : 1642337 Tx unicast : 379927
Rx multicast : 51619 Tx multicast : 205950
Rx broadcast : 91436 Tx broadcast : 150357
Rx FCS error : 0 Tx FCS error : 0
Rx Pause : 0 Tx Pause : 0
Rx Undersize : 0 Tx Oversize : 0
Rx FFP drop : 0 Tx CFI drop : 0
Rx Control frame : 0 Tx Cell error : 0
 Tx Jabber : 0
 Tx excessive collision: 0
 Tx tagged vlan : 0
 Tx abort : 0
```

**Table 64: show controllers switch inter-rack statistics Field Descriptions**

| Field | Description                                                                                     |
|-------|-------------------------------------------------------------------------------------------------|
| Port  | Logical port number. The range is from 0 to 21 and corresponds to the ports on the front panel. |

| Field                  | Description                                  |
|------------------------|----------------------------------------------|
| Tx Frames              | Transmit frame counter.                      |
| Tx Errors              | Transmit cell error counter.                 |
| Rx Frames              | Receive frame counter.                       |
| Rx Errors              | Receive code error counter.                  |
| Rx fragment            | Receive fragment counter.                    |
| Rx unicast             | Receive unicast frame counter.               |
| Rx multicast           | Receive multicast frame counter.             |
| Rx broadcast           | Receive broadcast frame counter.             |
| Rx FCS error           | Receive FCS error frame counter.             |
| Rx Pause               | Receive pause frame counter.                 |
| Rx Undersize           | Receive undersize frame counter.             |
| Rx FFP drop            | Packets dropped by FFP counter.              |
| Rx Control frame       | Receive control frame counter.               |
| Tx fragment            | Transmit fragment counter.                   |
| Tx unicast             | Transmit unicast frame counter.              |
| Tx multicast           | Transmit multicast frame counter             |
| Tx broadcast           | Transmit broadcast frame counter             |
| Tx FCS error           | Transmit FCS error frame counter             |
| Tx Pause               | Transmit pause control frame counter.        |
| Tx Oversize            | Transmit oversize packet counter.            |
| Tx CFI drop            | Number of CFI packets dropped for this port. |
| Tx Cell error          | Transmit cell error counter.                 |
| Tx Jabber              | Transmit jabber counter.                     |
| Tx excessive collision | Transmit excessive collision frame counter.  |

| Field          | Description                          |
|----------------|--------------------------------------|
| Tx tagged vlan | Transmit tagged VLAN packet counter. |
| Tx abort       | Transmit aborted packet counter.     |

# show controllers switch inter-rack stp

To display information for the spanning tree protocol (STP) of inter-rack switches for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card, use the **show controllers switch inter-rack stp** command in administration EXEC mode.

**show controllers switch inter-rack stp** {*location node-id*| *ports interface number* *location node-id*| **region** *location node-id*}

## Syntax Description

|                                      |                                                                                                                                                                                                         |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i>       | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |
| <b>ports</b> <i>interface number</i> | Displays the number for the Gigabit Ethernet interface. The range is from 0 to 21. The interface number that identifies the specific front panel GE port on the 22-port SCGE.                           |
| <b>region</b>                        | Displays MST region configuration information that includes MST revision number, instance to VLAN mapping, and MST region name.                                                                         |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |
| admin       | read       |

## Examples

The following sample output displays information for STP:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch inter-rack stp location f0/sc0/cpu0

MST 0 vlans mapped: 2-4094
Bridge address 5246.48f0.20ff priority 32768 (32768 sysid 0)
Root this switch for the CIST
Operational hello time 1, forward delay 6, max age 8, txholdcount 6
Configured hello time 1, forward delay 6, max age 8, max hops 4

Interface Role Sts Cost Prio.Nbr Type

MST 1 vlans mapped: 1
Bridge address 5246.48f0.20ff priority 32769 (32768 sysid 1)
Root this switch for MST1

Interface Role Sts Cost Prio.Nbr Type

GE_13 Desg FWD 20000 128. 14 P2p
GE_14 Desg FWD 20000 128. 15 P2p
GE_15 Desg FWD 20000 128. 16 P2p
GE_17 Desg FWD 20000 128. 18 P2p
GE_22 Desg FWD 20000 128. 23 P2p
```

**Table 65: show controllers switch inter-rack stp Field Descriptions**

| Field        | Description                                                                                           |
|--------------|-------------------------------------------------------------------------------------------------------|
| MST          | Multiple Spanning Tree (MST).                                                                         |
| vlans mapped | Number of VLANs mapped.                                                                               |
| Bridge       | Part of the bridge identifier and is taken as the most significant part of the bridge ID comparisons. |
| Root         | MAC address of Root and Priority.                                                                     |
| Operational  | Operational STP parameters.                                                                           |
| Configured   | STP configured parameters.                                                                            |
| Interface    | Interface running STP.                                                                                |
| Role         | MSTP role that includes designated, alternate, root, and backup.                                      |
| Sts          | Spanning tree state (STS) that includes forwarding, blocking, and learning.                           |
| Cost         | Cost associated with the port.                                                                        |
| Prio.        | Priority associated with the port.                                                                    |

# show controllers switch inter-rack uddl

To display the inter-rack connection for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card, use the **show controllers switch inter-rack uddl** command in administration EXEC mode.

**show controllers switch inter-rack uddl** *{interface number| all}* **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface number</i>        | Number for the Gigabit Ethernet interface. The range is from 0 to 21. The interface number identifies the specific front panel GE port on the 22-port SCGE.                                             |
| <b>all</b>                     | Displays statistics of all ports for inter-rack switches.                                                                                                                                               |
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |
| admin       | read       |



## Examples

The following sample output shows who is connected to the inter-rack on the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch inter-rack uddl all location f0/sc0/cpu0

Interface Gig port# 13

...
Current bidirectional state: Bidirectional
Current operational state: Advertisement - Single neighbor detected
...
...
 Entry 1

 ...
 Device name: 0_RP0_CPU0_Switch
 Port ID: GE_Port_0
 Neighbor echo 1 device: nodeF0_SC0_CPU0
 Neighbor echo 1 port: Gig port# 13
```

**Table 66: show controllers switch inter-rack uddl Field Descriptions**

| Field                       | Description                                                                                |
|-----------------------------|--------------------------------------------------------------------------------------------|
| Interface Gig port          | Interface number that identifies the specific front panel GE port on the 22-port SCGE.     |
| Current bidirectional state | Current bidirectional state of the port is undetermined, bidirectional, or unidirectional. |
| Current operational state   | Port operational status that includes up or error-disabled.                                |
| Device name                 | Connected device or neighbor.                                                              |
| Port ID                     | Port ID.                                                                                   |
| Neighbor echo 1 device      | Device ID of neighbor.                                                                     |
| Neighbor echo 1 port        | Port ID of neighbor.                                                                       |

# show controllers switch stp location

To display the STP information for intra-rack switches, use the **show controllers switch stp location** command in administration EXEC mode.

**show controllers switch stp location** *node-id*

| Syntax Description |                                                                                 |
|--------------------|---------------------------------------------------------------------------------|
| <i>node-id</i>     | The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation. |

**Command Default** No default behavior or values

**Command Modes** Administration EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.4.1 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The spanning tree protocol (STP) runs on links between RPs and SCs.

| Task ID | Task ID     | Operations |
|---------|-------------|------------|
|         | fabric      | read       |
|         | root-system | read       |

**Examples** The following sample output shows how to verify information for the spanning tree for location 0/rp0/CPU0 on the RP:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch stp location 0/rp0/Cpu0

MST 0 vlans mapped: 2-4094
Bridge address 0011.93ef.e392 priority 36864 (36864 sysid 0)
Root address 5246.48f0.20ff priority 32768 (32768 sysid 0)
 port GE_Port_0 path cost 0
Regional Root address 5246.48f0.20ff priority 32768 (32768 sysid 0)
 internal cost 20000 rem hops 3
Operational hello time 1, forward delay 6, max age 8, txholdcount 6
```

```

Configured hello time 1, forward delay 6, max age 8, max hops 4

Interface Role Sts Cost Prio.Nbr Type

MST 1 vlans mapped: 1
Bridge address 0011.93ef.e392 priority 36865 (36864 sysid 1)
Root address 5246.48f0.20ff priority 32769 (32768 sysid 1)
 port GE_Port_0 cost 20000 rem hops 3

Interface Role Sts Cost Prio.Nbr Type

FE_Port_1 Desg FWD 200000 128. 2 P2p
GE_Port_0 Root FWD 20000 128. 49 P2p

```

The following sample output shows how to verify the connection on intra-rack switches for the 22-port SCGE card:

```

RP/0/RP0/CPU0:router(admin)# show controllers switch stp location f0/sc0/CPU0

MST 0 vlans mapped: 2-4094
Bridge address 0800.453e.469a priority 36864 (36864 sysid 0)
Root address 5246.48f0.20ff priority 32768 (32768 sysid 0)
 port GE_Port_0 path cost 0
Regional Root address 5246.48f0.20ff priority 32768 (32768 sysid 0)
 internal cost 20000 rem hops 3
Operational hello time 1, forward delay 6, max age 8, txholdcount 6
Configured hello time 1, forward delay 6, max age 8, max hops 4

Interface Role Sts Cost Prio.Nbr Type

MST 1 vlans mapped: 1
Bridge address 0800.453e.469a priority 36865 (36864 sysid 1)
Root address 5246.48f0.20ff priority 32769 (32768 sysid 1)
 port GE_Port_0 cost 20000 rem hops 3

Interface Role Sts Cost Prio.Nbr Type

FE_Port_1 Desg FWD 200000 128. 2 P2p
GE_Port_0 Root FWD 20000 128. 49 P2p

```

**Table 67: show controllers switch stp location Field Descriptions**

| Field         | Description                            |
|---------------|----------------------------------------|
| MST           | Multiple Spanning Tree Protocol (MST). |
| vlans mapped  | VLANs mapped to MST instance.          |
| Bridge        | MAC address of Bridge and Priority.    |
| Root          | MAC address of Root and Priority.      |
| Regional Root | Root of the MST region.                |
| Operational   | Operational STP parameters.            |
| Configured    | STP configured parameters.             |
| Interface     | Interface running STP.                 |

 show controllers switch stp location

| Field         | Description                                                                 |
|---------------|-----------------------------------------------------------------------------|
| Role          | MSTP role that includes designated, alternate, root, and backup.            |
| Sts           | Spanning tree state (STS) that includes forwarding, blocking, and learning. |
| Cost          | Cost of path to root.                                                       |
| Prio.Nbr Type | Priority of switch port.                                                    |

# show controllers switch stp ports

To display the Spanning Tree Protocol (STP) information for intra-rack switches, use the **show controllers switch stp ports** command in administration EXEC mode.

**show controllers switch stp ports** {FE {0|1}| GE {0|1}} **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FE {0 1}</b>                | Displays information for the Fast Ethernet (FE) port. Choose one of the following values: <ul style="list-style-type: none"> <li>• 0—FE port number 0.</li> <li>• 1—FE port number 1.</li> </ul>        |
| <b>GE {0 1}</b>                | Displays information for the Gigabit Ethernet (GE) port. Choose one of the following values: <ul style="list-style-type: none"> <li>• 0—GE port number 0.</li> <li>• 1—GE port number 1.</li> </ul>     |
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



### Note

The port numbers must match the port numbers that are displayed on the front panel of the 22-port SCGE card.

**Task ID**

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

**Examples**

The following example shows the remote-end point that is connected to the GE link even if the remote endpoint is on a different chassis:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch stp ports FE 1 location 0/rp0/CPU0
```

```
FE_Port_1 of MST1 is designated forwarding
Edge port: no (default) port guard : none (default)
Link type: point-to-point (auto) bpdu filter: disable (default)
Boundary : internal bpdu guard : disable (default)
Bpdus (MRecords) sent 9190, received 3
```

```
Instance Role Sts Cost Prio.Nbr Vlans mapped

 1 Desg FWD 200000 128. 2 1
```

**Table 68: show controllers switch stp ports Field Descriptions**

| Field     | Description                                    |
|-----------|------------------------------------------------|
| GE Port   | Gigabit Ethernet (GE) port.                    |
| STP State | Spanning Tree Protocol (STP) state of the port |

# show controllers switch stp region

To display information for the spanning tree for the Multiple Spanning Tree (MST) region, use the **show controllers switch stp region** command in administration EXEC mode.

**show controllers switch stp region location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

## Examples

The following example displays sample output from the **show controllers switch stp region** command:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch stp region location 0/rp0/CPU0
Name [STP_1]
Revision 1
Instances configured 2

0 2-4094
1 1
```

```
show controllers switch stp region
```

-----



# show controllers switch uddl location

To display the Unidirectional Link Detection (UDLD) information for intra-rack switches, use the **show controllers switch uddl location** command in administration EXEC mode.

**show controllers switch uddl location** *node-id*

## Syntax Description

|                |                                                                                 |
|----------------|---------------------------------------------------------------------------------|
| <i>node-id</i> | The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation. |
|----------------|---------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

UDLD runs on links between RPs and SCs.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

## Examples

The following sample output shows who is connected on the RP:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch uddl location 0/rp0/CPU0
Interface GE_Port_0
...
Current bidirectional state: Bidirectional
Current operational state: Advertisement - Single neighbor detected
...
 Entry 1

 Device name: nodeF0_SC0_CPU0
```

**show controllers switch udd location**

```

Port ID: Gig port# 13
Neighbor echo 1 device: 0_RP0_CPU0_Switch
Neighbor echo 1 port: GE_Port_0

```

The following sample output shows an intra-rack connection for the 22-port Shelf Controller Gigabit Ethernet (22-port SCGE) card:

```

RP/0/RP0/CPU0:router(admin)# show controllers switch udd location f0/sc0/CPU0

Interface GE_Port_0

...
Current bidirectional state: Bidirectional
Current operational state: Advertisement - Single neighbor detected
...

Entry 1

...
Current neighbor state: Bidirectional
Device name: nodeF0_SC0_CPU0
Port ID: Gig port# 22
Neighbor echo 1 device: F0_SC0_CPU0_Switch
Neighbor echo 1 port: GE_Port_0

```

**Table 69: show controllers switch udd location Field Descriptions**

| Field                       | Description                                                                                                               |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Current bidirectional state | Current bidirectional state of the port is undetermined, bidirectional, or unidirectional.                                |
| Current operational state   | Port operational status that includes up or error-disabled.                                                               |
| Current neighbor state      | Neighbor state states that the link state is observed from the neighbor (undetermined, bidirectional, or unidirectional). |
| Device name                 | Connected device or neighbor.                                                                                             |
| Port ID                     | Port ID.                                                                                                                  |
| Neighbor echo 1 device      | Device ID of neighbor.                                                                                                    |
| Neighbor echo 1 port        | Port ID of neighbor.                                                                                                      |

# show controllers switch uddl ports

To display the information for Unidirectional Link Detection (UDLD) for a specified location, use the **show controllers switch uddl ports** command in administration EXEC mode.

**show controllers switch uddl ports** {FE {0| 1}| GE {0| 1}} **location** *node-id*

## Syntax Description

|                                |                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FE {0   1}</b>              | Displays information for the Fast Ethernet (FE) port. Choose one of the following values: <ul style="list-style-type: none"> <li>• 0—FE port number 0.</li> <li>• 1—FE port number 1.</li> </ul>        |
| <b>GE {0   1}</b>              | Displays information for the Gigabit Ethernet (GE) port. Choose one of the following values: <ul style="list-style-type: none"> <li>• 0—GE port number 0.</li> <li>• 1—GE port number 1.</li> </ul>     |
| <b>location</b> <i>node-id</i> | Specifies the specific RP/SC in the system in which the switches are present. This applies to location descriptions for the <i>node-id</i> argument as entered in the <i>rack/slot/module</i> notation. |

## Command Default

No default behavior or values

## Command Modes

Administration EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.4.1 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

UDLD runs on links between RPs and SCs.

**Task ID**

| Task ID     | Operations |
|-------------|------------|
| fabric      | read       |
| root-system | read       |

**Examples**

The following example displays sample output from the **show controllers switch udd ports** command:

```
RP/0/RP0/CPU0:router(admin)# show controllers switch udd ports FE 1 location 0/rp0/CPU0
Interface FE_PORT_1

Port enable administrative configuration setting: Enabled
Port enable operational state: Enabled
Current bidirectional state: Bidirectional
Current operational state: Advertisement - Single neighbor detected
Message interval: 7
Time out interval: 5

Entry 1

Expiration time: 16
Device ID: 1
Current neighbor state: Bidirectional
Device name: 0_RP1_CPU0_Switch
Port ID: FE_PORT_0
Neighbor echo 1 device: 0_RP0_CPU0_Switch
Neighbor echo 1 port: FE_PORT_1

Message interval: 7
Time out interval: 5
CDP Device name: BCM_SWITCH
```



# Link Bundling Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring Link Bundle interfaces on the Cisco CRS Router.

- [bundle-hash, page 746](#)
- [bundle id, page 752](#)
- [bundle maximum-active links, page 754](#)
- [bundle minimum-active bandwidth, page 758](#)
- [bundle minimum-active links, page 759](#)
- [bundle port-priority, page 761](#)
- [clear lacp counters, page 763](#)
- [interface \(bundle\), page 765](#)
- [lacp fast-switchover, page 767](#)
- [lacp packet-capture, page 769](#)
- [lacp period short, page 772](#)
- [lacp system priority, page 775](#)
- [show bundle, page 777](#)
- [show bundle brief, page 789](#)
- [show bundle replication bundle-ether, page 792](#)
- [show lacp bundle, page 793](#)
- [show lacp counters, page 796](#)
- [show lacp io, page 798](#)
- [show lacp packet-capture, page 801](#)
- [show lacp port, page 804](#)
- [show lacp system-id, page 807](#)

# bundle-hash

To display the source and destination IP addresses for the member links, distributed by the load balancing feature, in a multilink interface bundle, use the **bundle-hash** command in EXEC mode.

**bundle-hash** {**Bundle-Ether** *bundle-id*| **Bundle-POS** *bundle-id*| **members** {**GigabitEthernet**| **TenGigabitEthernet**| **POS**} *interface-path-id*}

## Syntax Description

|                                      |                                                                                                                                                                                                                                                                                 |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bundle-Ether</b> <i>bundle-id</i> | Specifies an Ethernet bundle for which you want to calculate load balancing. Range is 1- 65535.                                                                                                                                                                                 |
| <b>Bundle-POS</b> <i>bundle-id</i>   | Specifies a POS bundle for which you want to calculate load balancing. Range is 1- 65535.                                                                                                                                                                                       |
| <b>members</b>                       | Identifies specific bundle member links for which you want to calculate load balancing.                                                                                                                                                                                         |
| <b>GigabitEthernet</b>               | Specifies the Gigabit Ethernet interface for which you want to calculate load balancing.                                                                                                                                                                                        |
| <b>TenGigE</b>                       | Specifies the 10 Gigabit Ethernet interface for which you want to calculate load balancing.                                                                                                                                                                                     |
| <b>POS</b>                           | Specifies the POS interface for which you want to calculate load balancing.                                                                                                                                                                                                     |
| <i>interface-path-id</i>             | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.6.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Bundle interface traffic is distributed over the various member links of a bundle according to a hash function. The **bundle-hash** command allows you to determine which bundle member link will carry a particular flow of traffic.

You can use the **bundle-hash** command to get the following information:

- Which members are used for a specified source/destination address pair,
- such as 10.10.10.1 20.20.20.1
- The destination IP address for a specified source IP address on a specified member.
- The load balancing distribution—how many times the members of a bundle are used for a specified range of IP addresses.



### Note

The **bundle-hash** command does not display all possible IP addresses in an entire series. It stops displaying addresses after all the addresses for all the members of the bundle have been displayed once.

The **bundle-hash** command invokes a utility that initially prompts you to select some options. Based on the options you select, the utility prompts you more options to select. The initial options to select are as follows:

- L3/3-tuple or L4/7-tuple
- Single pair or Range
- IPv4 or IPv6

The **bundle-hash** command utility prompts you for these options as follows:

- Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4):
- Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]:
- Enter bundle type IP V4 (1) or IP V6 (2):
- Enter source IP V4 address:
- Enter destination IP V4 address:
- Compute destination address set for all members? [y/n]:
- Enter subnet prefix for destination address set:
- Enter bundle IP V4 address [10.10.10.10]:

You may also be prompted to make further option choices depending on your selections.

[Table 70: bundle-hash Command Options, on page 747](#) provides a general summary of the options and the information you need to provide for each selected option. The actual information that you need to provide depends on the selections you make and may vary from the information provided in [Table 70: bundle-hash Command Options, on page 747](#).

**Table 70: bundle-hash Command Options**

| Option      | Information You Need to Provide                                                                                                                                                                                                                                                                                                                                                  |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L3/3-tuple  | L3 information: <ul style="list-style-type: none"> <li>• Source IP address</li> <li>• Destination IP address</li> <li>• Destination subnet prefix</li> <li>• Bundle IP address</li> </ul>                                                                                                                                                                                        |
| L4/7-tuple  | L3 information: <ul style="list-style-type: none"> <li>• Source IP address</li> <li>• Destination IP address</li> <li>• Protocol</li> </ul> L4 information: <ul style="list-style-type: none"> <li>• Source port</li> <li>• Destination port</li> </ul> Platform-related information: <ul style="list-style-type: none"> <li>• Router ID</li> <li>• Ingress interface</li> </ul> |
| Single pair | Information for a single source port and destination port. The utility uses this information to calculate the hash and display the bundle load-balance distribution among the user-provided physical/bundle links.<br><br>The default is single mode.<br><br>While in single mode, you may receive the following prompt:                                                         |
| Range       | Information for sets of source and destination addresses to generate a packet flow for each set. The utility uses this information to calculate the hash for the generated packet flows and display the user-provided egress member links/bundle interfaces and the number of packet flows on each link.                                                                         |
| IPv4        | IPv4 addresses                                                                                                                                                                                                                                                                                                                                                                   |
| IPv6        | IPv6 addresses                                                                                                                                                                                                                                                                                                                                                                   |



Compute destination address set for all members [y|n]:

If you enter y(es), several sample IPv4 addresses in the destination subnet are generated, and the link is calculated for each sample address. During this calculation, the destination network address is derived from the destination IPv4 address and the subnet prefix.

## Task ID

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

## Examples

The following example shows the **members** keyword prompts and options:

```
RP/0/RP0/CPU0:router# bundle-hash members pos 0/2/0/1

Thu Aug 20 20:19:21.241 DST
Single SA/DA pair or range: S/R [S]: s
Enter source IP V4 address: 10.10.10.10
Enter source IP V4 address: 10.10.10.10
Enter destination IP V4 address: 20.20.20.20
Compute destination address set for all members? [y/n]: y
Enter subnet prefix for destination address set: 8
Enter bundle IP V4 address [10.10.10.10]: 10.10.10.11

Link hashed [hash:0] to is POS0/2/0/1 member id 0 ifh 0x3000f00

Destination address set for subnet 20.0.0.0:
 20.0.0.1 [hash:4] hashes to link POS0/2/0/1

Another? [y]:
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 28) using the 3-tuple hash algorithm, a single source and destination, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 28

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): 13
Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]: s

Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address: 10.12.28.2
Enter destination IP V4 address: 10.12.28.1
Compute destination address set for all members? [y/n]: y
Enter subnet prefix for destination address set: 8
Enter bundle IP V4 address [10.12.28.2]: 10.12.28.2

Link hashed to is GigabitEthernet0/6/5/7

Destination address set for subnet 10.0.0.0:
 10.0.0.6 hashes to link GigabitEthernet0/1/5/6
 10.0.0.8 hashes to link GigabitEthernet0/6/5/5
 10.0.0.12 hashes to link GigabitEthernet0/6/5/6
 10.0.0.2 hashes to link GigabitEthernet0/6/5/7
 10.0.0.1 hashes to link GigabitEthernet0/1/5/7
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 28) using the 3-tuple hash algorithm, a range of source and destinations, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 28

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): 13
Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]: r

Maximum number of flows (num src addr * num dst addr): 65536

Enter first source IP address: 10.12.28.2
Enter subnet prefix for source address set: 8
Enter number of source addresses (1-245): 20
Enter source address modifier (1-12) [def:1]: 5

Enter destination IP address: 10.12.28.1
Enter subnet prefix for destination address set: 8
Enter number of destination addresses (1-245): 20
Enter destination address modifier (1-12) [1]: 5
Many to many (M) or simple pairs (S)? [M]: s

Calculating simple pairs...

Total number of hits 20
Member GigabitEthernet0/1/5/6 has 6 hits
Member GigabitEthernet0/6/5/5 has 2 hits
Member GigabitEthernet0/6/5/6 has 2 hits
Member GigabitEthernet0/6/5/7 has 9 hits
Member GigabitEthernet0/1/5/7 has 1 hits
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 202) using the 7-tuple hash algorithm, a single source and destination, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 202

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): 14
Single SA:SP/DA:SP pair (IPv4,IPv6) or range (IPv4 only): S/R [S]: s

Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address: 172.20.180.167
Enter destination IP V4 address: 172.30.15.42

Ingress interface --
- physical interface format: [POS | GigabitEthernet | TenGigE]R/S/I/P
- bundle interface format: [Bundle-Ether | Bundle-POS]bundle-id
Enter ingress interface: GigabitEthernet0/2/0/3

Enter L4 protocol (TCP,UDP,SCTP,L2TPV3,NONE): UDP
Enter src port: 1000
Enter destination port: 2000
Compute destination address set for all members? [y/n]: n

S/D pair 172.20.180.167:1000/172.30.15.42:2000 -- Link hashed to is GigabitEthernet0/3/3/6

Another? [y]: y

Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address [172.20.180.167]: 172.20.180.167
Enter destination IP V4 address [172.30.15.42]: 172.30.15.42

Ingress interface --
- physical interface format: [POS | GigabitEthernet | TenGigE]R/S/I/P
- bundle interface format: [Bundle-Ether | Bundle-POS]bundle-id
Enter ingress interface [GigabitEthernet0/2/0/3]: GigabitEthernet0/2/0/3

Enter L4 protocol (TCP,UDP,SCTP,L2TPV3,NONE) [udp]: UDP
Enter src port [1000]: 1000
Enter destination port [2000]: 2000
```

```
Compute destination address set for all members? [y/n]: y
Enter subnet prefix for destination address set: 24
Enter bundle IP V4 address [172.20.180.167]: 209.165.200.225

S/D pair 172.20.180.167:1000/172.30.15.42:2000 -- Link hashed to is GigabitEthernet0/3/3/6

Destination address set for subnet 172.30.15.0:
 S/D pair 172.20.180.167:1000/172.30.15.1:2000 hashes to link GigabitEthernet0/3/3/6
 S/D pair 172.20.180.167:1000/172.30.15.6:2000 hashes to link GigabitEthernet0/2/0/1
 S/D pair 172.20.180.167:1000/172.30.15.3:2000 hashes to link GigabitEthernet0/2/0/2
 S/D pair 172.20.180.167:1000/172.30.15.5:2000 hashes to link GigabitEthernet0/0/3/0

Another? [y]: n
```

**Related Commands**

| Command                                  | Description                                    |
|------------------------------------------|------------------------------------------------|
| <a href="#">show bundle, on page 777</a> | Displays information about configured bundles. |

# bundle id

To add a port to an aggregated interface (or bundle), enter the **bundle id** command in interface configuration mode.

**bundle id** *bundle-id* [**mode** {**active**|**on**|**passive**}]

**no bundle id** *bundle-id*

## Syntax Description

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>bundle-id</i> | Number of the bundle (from 1 to 65535) on which you want to add a port.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>mode</b>      | (Optional) Specifies the mode of operation, as follows: <ul style="list-style-type: none"> <li>• <b>active</b>—Use the <b>mode active</b> keywords to run Link Aggregation Control Protocol (LACP) in active mode over the port. When you specify <b>active</b>, the port joins the bundle and is activated if LACP determines that it is compatible.</li> <li>• <b>on</b>—Use the <b>mode on</b> keywords to configure an Etherchannel link over the port (no LACP running over the port).</li> <li>• <b>passive</b>—Use the <b>mode passive</b> keywords to run LACP in passive mode over the port. When you specify <b>passive</b>, LACP packets are sent only if the other end of the link is using active LACP. The link joins the bundle and is activated if LACP packets are exchanged and the port is compatible.</li> </ul> |

## Command Default

The default setting is **mode on**.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                                                            |
|---------------|-------------------------------------------------------------------------|
| Release 3.2   | This command was introduced.                                            |
| Release 3.3.0 | The <b>bundle id</b> command syntax was changed from <b>bundle-id</b> . |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you enter the **bundle id** command and specify a port that is already bound to a bundle, the port unbinds from the original bundle and becomes attached to the new bundle. If the bundle numbers are the same, then the port does not unbind, but the mode changes to mode you specified with the **bundle id** command.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

**Examples**

The following example shows how to add a port onto a bundle:

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/1/5/0
RP/0/RP0/CPU0:router(config-if)# bundle id 1
```

The following example shows how to add an active LACP port onto an aggregated interface (or bundle):

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/6/5/7
RP/0/RP0/CPU0:router(config-if)# bundle id 5 mode active
```

**Related Commands**

| Command                                       | Description                                                                             |
|-----------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show bundle, on page 777</a>      | Displays information about configured bundles.                                          |
| <a href="#">show interfaces, on page 629</a>  | Displays statistics for all interfaces configured on the router or for a specific node. |
| <a href="#">show lacp bundle, on page 793</a> | Displays detailed information about LACP ports and their peers.                         |
| <a href="#">show lacp port, on page 804</a>   |                                                                                         |

## bundle maximum-active links

To designate one active link and one link in standby mode that can take over immediately for a bundle if the active link fails, use the **bundle maximum-active links** command in interface configuration mode. To return to the default maximum active links value, use the **no** form of this command.

**bundle maximum-active links** *links* [**hot-standby**]

**no bundle maximum-active links** *links*

### Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>links</i>       | Number of active links you want to bring up in the specified bundle, up to the maximum supported on the platform. The range is 1 to 64.                                                                                                                                                                                                               |
| <b>hot-standby</b> | (Optional) Determines how a switchover between active and standby links is implemented. This option is available only on links with LACP enabled. By default, a switchover is implemented per an IEEE standard approach. If you optionally specify the <b>hot-standby</b> keyword, a switchover is implemented per a faster proprietary optimization. |

### Command Default

No default behavior or values

### Command Modes

Interface configuration

### Command History

| Release       | Modification                              |
|---------------|-------------------------------------------|
| Release 3.3.0 | This command was introduced.              |
| Release 3.8.0 | The <b>hot-standby</b> keyword was added. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

By default, multiple links can actively carry traffic for a bundle. However, if one of the links fails, there is no dedicated standby link to take its place. The **bundle maximum-active links** command enables you to implement the optional 1:1 link protection, which means for the specified bundle, you designate one active link and one or more standby links that can take over immediately if the active link fails.

By setting the **bundle maximum-active links** command to 1, the highest-priority link within the bundle becomes active (distributing state) and the remaining links are in standby mode. If a standby link meets one of the following criteria, it is in the collecting state:

- Running Link Aggregation Control Protocol (LACP), and the **hot-standby** option is implemented.
- Not running LACP.

If a standby link does not meet either of these criteria, it is in the waiting state.

The second highest-priority link within the bundle becomes the standby link that takes over immediately if the active link fails. The priority is based on the value from the **bundle port-priority** command, where a lower value is a higher priority. Therefore, you must configure the highest priority (lowest value) for the link that you want to be active and the second-highest priority for the link that you want to act as a backup to the active link.

**Note**

We recommend designating only one backup link to the active link. Although you can designate an additional backup link, maintaining two backup links consumes more bandwidth and offsets any benefits that may be gained.

**Note**

If a link is not running LACP, the configuration of the **bundle maximum-active links** and **bundle port-priority** commands or equivalent commands must be the same on both ends of the link. If a link is running LACP, the configuration of the **bundle maximum-active links** command only must be the same on both ends of the link.

The **hot-standby** option of using an IEEE standard-based switchover (the default) or a faster proprietary optimized switchover is available only for active and standby links running LACP. For links not running LACP, the proprietary optimized switchover option is used.

When using one of the **hot-standby** options on a Cisco IOS XR device, the peer device must have a standby link configured and be one of the following:

- Another Cisco IOS XR device using the same option.
- Another device using an IEEE standard-based switchover. (Cisco does not recommend using this option because unexpected behavior, such as the peer sending traffic on the standby link, can occur.)

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

**Examples**

In the following example, the user implements 1:1 link protection for Ethernet bundle 5 and specifies that the proprietary optimization is used for the LACP-enabled active and standby links:

```
RP/0/RP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RP0/CPU0:router(config-if)# bundle maximum-active links 1 hot-standby
```

The following example shows how to display information about Ethernet bundle 5:

```
RP/0/RP0/CPU0:router# show bundle bundle-ether 5

State: 0 - Port is Detached. 1 - Port is Waiting.
 2 - Port is Attached. 3 - Port is Collecting.
 4 - Port is Distributing.

Bundle-Ether 5
Minimum active Maximum active
```

| B/W (Kbps) | MAC address     | Links | B/W (Kbps) | Links |
|------------|-----------------|-------|------------|-------|
| 1000000000 | 1d.e5eb.2898111 |       |            |       |

| Port      | State | Port ID        | B/W (Kbps) | MAC address    |
|-----------|-------|----------------|------------|----------------|
| Te0/1/0/1 | 4     | 0x8000, 0x0001 | 10000000   | 0000.abab.0001 |
| Te0/1/0/0 | 3     | 0x8000, 0x0002 | 10000000   | 0000.abab.0000 |

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 3, which indicates that the port is collecting.

In the following example, the user implements 1:1 link protection for Ethernet bundle 5 and does not specify the **hot-standby** keyword, because the user wants to use the default IEEE standard-based switchover on the LACP-enabled active and standby links:

```
RP/0/RP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RP0/CPU0:router(config-if)# bundle maximum-active links 1
```

The following example shows how to display information about Ethernet bundle 5:

```
RP/0/RP0/CPU0:router# show bundle bundle-ether 5
```

State: 0 - Port is Detached. 1 - Port is Waiting.  
 2 - Port is Attached. 3 - Port is Collecting.  
 4 - Port is Distributing.

Bundle-Ether 5

| B/W (Kbps) | MAC address     | Minimum active Links | B/W (Kbps) | Maximum active Links |
|------------|-----------------|----------------------|------------|----------------------|
| 1000000000 | 1d.e5eb.2898111 |                      |            |                      |

| Port      | State           | Port ID        | B/W (Kbps) | MAC address    |
|-----------|-----------------|----------------|------------|----------------|
| Te0/1/0/1 | 4               | 0x8000, 0x0001 | 10000000   | 0000.abab.0001 |
| Te0/1/0/0 | 10x8000, 0x0002 |                | 10000000   | 0000.abab.0000 |

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 1, which indicates that the port is waiting.

In the following example, the user implements 1:1 link protection for Ethernet bundle 5 and does not specify the **hot-standby** keyword, because the LACP-disabled link automatically uses the proprietary optimized switchover:

```
RP/0/RP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RP0/CPU0:router(config-if)# bundle maximum-active links 1
```

The following example shows how to display information about Ethernet bundle 5:

```
RP/0/RP0/CPU0:router# show bundle bundle-ether 5
```

State: 0 - Port is Detached. 1 - Port is Waiting.  
 2 - Port is Attached. 3 - Port is Collecting.  
 4 - Port is Distributing.

Bundle-Ether 5

| B/W (Kbps) | MAC address     | Minimum active Links | B/W (Kbps) | Maximum active Links |
|------------|-----------------|----------------------|------------|----------------------|
| 1000000000 | 1d.e5eb.2898111 |                      |            |                      |

| Port      | State | Port ID        | B/W (Kbps) | MAC address    |
|-----------|-------|----------------|------------|----------------|
| Te0/1/0/1 | 4     | 0x8000, 0x0001 | 10000000   | 0000.abab.0001 |



```
Te0/1/0/0 3 0x8000, 0x0002 10000000 0000.abab.0000
```

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 3, which indicates that the port is collecting.

#### Related Commands

| Command                                                  | Description                                                             |
|----------------------------------------------------------|-------------------------------------------------------------------------|
| <a href="#">bundle minimum-active links, on page 759</a> | Sets the number of active links required to bring up a specific bundle. |
| <a href="#">show bundle, on page 777</a>                 | Displays information about configured bundles.                          |
| <a href="#">show lacp bundle, on page 793</a>            | Displays detailed information about LACP ports and their peers.         |

# bundle minimum-active bandwidth

To set the minimum amount of bandwidth required before a user can bring up a specific bundle, use the **bundle minimum-active bandwidth** command in interface configuration mode.

**bundle minimum-active bandwidth** *kbps*

|                           |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                          |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>kbps</i>                                                                                                                                                                                                                                                                                                                                                                                     | Minimum bandwidth required before you can bring up a bundle. Range is from 1 through a number that varies depending on the platform and the bundle type. |
| <b>Command Default</b>    | <i>kbps</i> : 1                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                          |
| <b>Command Modes</b>      | Interface configuration                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                          |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                                                                                                                                                                                                                                  | <b>Modification</b>                                                                                                                                      |
|                           | Release 3.3.0                                                                                                                                                                                                                                                                                                                                                                                   | This command was introduced.                                                                                                                             |
| <b>Usage Guidelines</b>   | To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.                                                                                                                                                           |                                                                                                                                                          |
| <b>Task ID</b>            | <b>Task ID</b>                                                                                                                                                                                                                                                                                                                                                                                  | <b>Operations</b>                                                                                                                                        |
|                           | bundle                                                                                                                                                                                                                                                                                                                                                                                          | read, write                                                                                                                                              |
| <b>Examples</b>           | <p>The following example shows how to set the minimum amount of bandwidth required before a user can bring up a specific bundle. In this example, the user sets the minimum amount of bandwidth required to bring up Ethernet bundle 1 to 620000:</p> <pre>RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1 RP/0/RP0/CPU0:router(config-if)# bundle minimum-active bandwidth 620000</pre> |                                                                                                                                                          |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                                                                                                                                                                                                                                  | <b>Description</b>                                                                                                                                       |
|                           | <a href="#">show bundle</a> , on page 777                                                                                                                                                                                                                                                                                                                                                       | Displays information about configured bundles.                                                                                                           |

# bundle minimum-active links

To set the number of active links required to bring up a specific bundle, use the **bundle minimum-active links** command in interface configuration mode.

**bundle minimum-active links** *links*

## Syntax Description

|              |                                                                                                    |
|--------------|----------------------------------------------------------------------------------------------------|
| <i>links</i> | Minimum number of active links allowed in the specified bundle.<br>The range is from 1 through 64. |
|--------------|----------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Interface configuration

## Command History

| Release       | Modification                                         |
|---------------|------------------------------------------------------|
| Release 3.3.0 | This command was introduced.                         |
| Release 3.9.0 | The command range maximum was changed from 32 to 64. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

## Examples

The following example shows how to set the number of active links required to bring up a specific bundle. In this example, the user configures Ethernet bundle 5 so that two links must be active before the bundle can be brought up:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0/CPU0:router(config-if)# bundle minimum-active links 2
```

**Related Commands**

| Command                                                  | Description                                    |
|----------------------------------------------------------|------------------------------------------------|
| <a href="#">bundle maximum-active links, on page 754</a> |                                                |
| <a href="#">show bundle, on page 777</a>                 | Displays information about configured bundles. |

# bundle port-priority

To configure a port priority for a bundle member link, enter the **bundle port-priority** command in interface configuration mode. To return to the default priority value, use the **no** form of this command.

**bundle port-priority** *priority*

**no bundle port-priority** *priority*

## Syntax Description

|                 |                                                                                                                                                          |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>priority</i> | Priority for this port, where a lower value equals a higher priority. Replace the <i>priority</i> argument with a number. Range is from 1 through 65535. |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

*priority*: 32768

## Command Modes

Interface configuration

## Command History

| Release       | Modification                                                                                 |
|---------------|----------------------------------------------------------------------------------------------|
| Release 3.2   | This command was introduced.                                                                 |
| Release 3.3.0 | The command name was changed from <b>lACP port-priority</b> to <b>bundle port-priority</b> . |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **bundle port-priority** command enables you to determine whether or not similar ports, for example, Gigabit Ethernet ports with Link Aggregation Control Protocol (LACP) enabled or with LACP disabled, are aggregated based on the priority of the port.

In cases where LACP is enabled on aggregated ports, the port priority forms part of the port ID, which is transmitted within a packet when a device exchanges packets with its peer. The peers use the port ID within the packets to determine whether a given port should carry traffic for the bundle.

In cases where LACP is disabled, the port priority is used locally, and a device does not communicate its priority to a peer. Therefore, the peers should have the same priority configured to avoid a mismatch in which links are used for carrying traffic. For example, you could set up the port priorities so that a device would use links 1, 3, and 4 for carrying traffic, and its peer would use links 1, 2, and 3, where links use the same numbering sequence at both ends.

**Note**

A lower value is a higher priority for the port.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

**Examples**

The following example shows how to configure the priority of a port:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# bundle port-priority 1
```

**Related Commands**

| Command                                          | Description                                                     |
|--------------------------------------------------|-----------------------------------------------------------------|
| <a href="#">bundle id, on page 752</a>           | Adds a port to an aggregated interface or bundle.               |
| <a href="#">show lacp bundle, on page 793</a>    | Displays detailed information about LACP ports and their peers. |
| <a href="#">show lacp port, on page 804</a>      |                                                                 |
| <a href="#">show lacp system-id, on page 807</a> | Displays the local system ID used by the LACP.                  |

# clear lacp counters

To clear Link Aggregation Control Protocol (LACP) counters for all members of all bundles, all members of a specific bundle, or for a specific port, enter the **clear lacp counters** command in EXEC mode.

**clear lacp counters** [**bundle** {**Bundle-Ether** *bundle-id*| **Bundle-POS** *bundle-id*}| **port** {**GigabitEthernet** *interface-path-id*| **TenGigE** *interface-path-id*| **POS** *interface-path-id*}]

## Syntax Description

|                                    |                                                                                                                                                                                                                                                                                 |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>bundle</b>                      | (Optional) Clears LACP counters for all members of a bundle.                                                                                                                                                                                                                    |
| <b>Bundle-Ether</b> <i>node-id</i> | (Optional) Ethernet bundle. Use the <i>node-id</i> argument to specify the node ID number of the LACP counters you want to clear. Range is 1 through 65535.                                                                                                                     |
| <b>Bundle-POS</b> <i>bundle-id</i> | (Optional) POS bundle. Use the <i>bundle-id</i> argument to specify the bundle ID number of the LACP counters you want to clear. Range is from 1 through 65535.                                                                                                                 |
| <b>port</b>                        | (Optional) Clears all LACP counters on the specified bundle or interface.                                                                                                                                                                                                       |
| <b>GigabitEthernet</b>             | (Optional) Gigabit Ethernet interface. Use the <i>interface-path-id</i> argument to specify the Gigabit Ethernet interface whose LACP counters you want to clear.                                                                                                               |
| <b>TenGigE</b>                     | (Optional) Ten Gigabit Ethernet interface. Use the <i>interface-path-id</i> argument to specify the Ten Gigabit Ethernet interface whose LACP counters you want to clear.                                                                                                       |
| <b>POS</b>                         | (Optional) Packet-over-SONET/SDH (POS) interface. Use the <i>interface-path-id</i> argument to specify the POS interface whose LACP counters you want to clear.                                                                                                                 |
| <i>interface-path-id</i>           | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

### Task ID

| Task ID        | Operations  |
|----------------|-------------|
| bundle         | execute     |
| basic-services | read, write |

### Examples

The following example shows how to clear LACP counters:

```
RP/0/RP0/CPU0:router# clear lacp counters
```

### Related Commands

| Command                                                          | Description               |
|------------------------------------------------------------------|---------------------------|
| <a href="#">show lacp counters</a> , <a href="#">on page 796</a> | Displays LACP statistics. |



# interface (bundle)

To create a new bundle and enter interface configuration mode for that bundle, use the **interface (bundle)** command in global configuration mode. To delete a bundle, use the **no** form of this command.

**interface {Bundle-Ether | Bundle-POS }*bundle-id***

**no interface {Bundle-Ether | Bundle-POS }*bundle-id***

## Syntax Description

|                     |                                                             |
|---------------------|-------------------------------------------------------------|
| <b>Bundle-Ether</b> | Specifies or creates an Ethernet bundle interface.          |
| <b>Bundle-POS</b>   | Specifies or creates a POS bundle interface.                |
| <i>bundle-id</i>    | Number from 1 to 65535 that identifies a particular bundle. |

## Command Default

No bundle interface is configured.

## Command Modes

Global configuration (config)

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

## Usage Guidelines

You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operation   |
|---------|-------------|
| bundle  | read, write |

## Examples

The following example shows how to create an Ethernet bundle and enter interface configuration mode:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 3
RP/0/RP0/CPU0:router(config-if)#
```

The following example shows how to create a new POS bundle and enter interface configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-POS 10
```

**interface (bundle)**

```
RP/0/RP0/CPU0:router(config-if)#
```

**Related Commands**

| Command                                  | Description                                    |
|------------------------------------------|------------------------------------------------|
| <a href="#">show bundle, on page 777</a> | Displays information about configured bundles. |

# lacp fast-switchover

To disable the wait-while timer in the LACP state machine, use the **lacp fast-switchover** command in interface configuration mode. To re-enable the wait-while timer, use the **no** form of this command.

**lacp fast-switchover**

**no lacp fast-switchover**

**Syntax Description** This command has no keywords or arguments.

**Command Default** The wait-while timer in the LACP state machine is enabled.

**Command Modes** Interface configuration (config-if)

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you have 1:1 link protection enabled (you set the value of the **bundle maximum-active links** command to 1) on a bundle with member links running LACP, you can optionally disable the wait-while timer in the LACP state machine. Disabling this timer causes a bundle member link in standby mode to expedite its normal state negotiations, thereby enabling a faster switchover from a failed active link to the standby link.

Regardless of the type of switchover you are using, the default IEEE standard-based or the faster proprietary optimized switchover, the state negotiations of the standby link is expedited. (For more information about the switchover types, refer to the [bundle maximum-active links, on page 754](#) command.) However, enabling the **lacp fast-switchover** command provides a greater benefit if used with the IEEE standard-based switchover.

**Examples** The following example shows how to disable the wait-while timer for LACP-enabled member links of Bundle-Ether 28:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RP0/CPU0:router(config-if)# lacp fast-switchover
```

The following example shows how to re-enable the wait-while timer for LACP-enabled member links of Bundle-Ether 28:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RP0/CPU0:router(config-if)# no lacp fast-switchover
```

**Related Commands**

| Command                                                  | Description |
|----------------------------------------------------------|-------------|
| <a href="#">bundle maximum-active links, on page 754</a> |             |

# lACP packet-capture

To capture LACP packets so that their information can be displayed by the **show lACP packet-capture** command, use the **lACP packet-capture** command in EXEC mode.

```
{lACP packet-capture gigabitEthernet interface-path-id pos interface-path-id | tengige interface-path-id
number-of-packets}
```

To stop capturing LACP packets or to clear captured LACP packets, use the **lACP packet-capture** command in EXEC mode.

```
{lACP packet-capture [bundle-ether bundle-id] [bundle-pos bundle-id] [gigabitEthernet interface-path-id]
[pos interface-path-id] [tengige interface-path-id] clear| stop}
```

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>bundle-ether</b>      | Ethernet bundle interface specified by <i>bundle-id</i> .                                                                                                                                                                                                                       |
| <b>bundle-pos</b>        | Packet-over-SONET (POS) bundle interface specified by <i>bundle-id</i> .                                                                                                                                                                                                        |
| <b>GigabitEthernet</b>   | Gigabit Ethernet interface specified by <i>interface-path-id</i> .                                                                                                                                                                                                              |
| <b>POS</b>               | Packet-over-SONET (POS) interface specified by <i>interface-path-id</i> .                                                                                                                                                                                                       |
| <b>TenGigE</b>           | Ten Gigabit Ethernet interface specified by <i>interface-path-id</i> .                                                                                                                                                                                                          |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <i>bundle-id</i>         | Number specifying the bundle interface. The range is 1 to 65535.                                                                                                                                                                                                                |
| <i>number-of-packets</i> | Number of packets to capture.                                                                                                                                                                                                                                                   |
| <b>clear</b>             | Clears all currently captured packets.                                                                                                                                                                                                                                          |
| <b>stop</b>              | Stops capturing packets.                                                                                                                                                                                                                                                        |

## Command Default

The default (no parameters) executes globally for all interfaces on the line card.

## Command Modes

EXEC

**Command History**

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **lACP packet-capture** command captures transmitted and received LACP packets on a single bundle member interface. The contents of these packets can then be displayed by the **show lACP packet-capture** command. If the **lACP packet-capture** command is not issued, the **show lACP packet-capture** command does not display any information.

The **lACP packet-capture** command continues capturing LACP packets until the **stop** keyword is issued for that port or that bundle. Captured packets are stored and continue to be displayed until the **clear** keyword is issued for that port or that bundle.

LACP packets can only be captured for one port on a line card at a time. Starting a packet capture on a port implicitly stops and clears all packet-captures on all other ports on that line card.

To **stop** capturing LACP packets before the specified number of packets have been captured, issue the **stop** keyword.

If **stop** is specified for a single interface, packet capturing is stopped only on that interface.

If **stop** is specified for a bundle interface, packet capturing is stopped on all members of that bundle.

If **stop** is specified globally (the default - no parameters), packet capturing is stopped on all bundle interfaces on the router.

To **clear** all captured LACP packets that are stored for an interface, issue the **clear** keyword.

If **clear** is specified for a single interface, packets are cleared only on that interface.

If **clear** is specified for a bundle interface, packets are cleared on all members of that bundle.

If **clear** is specified globally (the default - no parameters), packets are cleared on all bundle interfaces on the router.

**Task ID**

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

**Examples**

The following example shows how to capture LACP packets on a POS interface:

```
RP/0/RP0/CPU0:router# lACP packet-capture pos 0/1/0/0 100
```

The following example shows how to stop capturing LACP packets on a POS interface:

```
RP/0/RP0/CPU0:router# lACP packet-capture pos 0/1/0/0 stop
```

The following example shows how to clear all captured LACP packets on a POS interface:

```
RP/0/RP0/CPU0:router# lacp packet-capture pos 0/1/0/0 clear
```

The following example shows how to capture LACP packets on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# lacp packet-capture gigabitethernet 0/2/0/0 100
```

The following example shows how to stop capturing LACP packets on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# lacp packet-capture gigabitethernet 0/2/0/0 stop
```

## Related Commands

| Command                                               | Description                                                                                                          |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <a href="#">show lacp io, on page 798</a>             | Displays the LACP transmission information that used by the transmitting device for sending packets on an interface. |
| <a href="#">show lacp packet-capture, on page 801</a> | Displays the contents of LACP packets that are sent and received on an interface.                                    |
| <a href="#">lacp period short, on page 772</a>        | Enables a short period time interval for the transmission and reception of LACP packets.                             |

# lacp period short

To enable a short period time interval for the transmission and reception of Link Aggregation Control Protocol (LACP) packets, use the **lacp period short** command in interface configuration mode. To return to the default short period, use the **no** form of this command.

**lacp period short** [*receive interval*] [*transmit interval*]

**no lacp period short** [*receive interval*] [*transmit interval*]

## Syntax Description

|                          |                                                                                                                                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>receive interval</b>  | Time interval (in milliseconds) for receiving LACP packets when LACP short period is enabled. The range is 100 to 1000 and must be multiples of 100, such as 100, 200, 300, and so on.    |
| <b>transmit interval</b> | Time interval (in milliseconds) for transmitting LACP packets when LACP short period is enabled. The range is 100 to 1000 and must be multiples of 100, such as 100, 200, 300, and so on. |

## Command Default

The default is 1000.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                                                |
|---------------|-------------------------------------------------------------|
| Release 3.2   | This command was introduced.                                |
| Release 3.9.0 | The keywords <b>transmit</b> and <b>receive</b> were added. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you configure a custom LACP short period *transmit* interval at one end of a link, you must configure the same time period for the *receive* interval at the other end of the link.



### Note

You must always configure the *transmit* interval at both ends of the connection before you configure the *receive* interval at either end of the connection. Failure to configure the *transmit* interval at both ends first results in route flapping (a route going up and down continuously). When you remove a custom LACP short period, you must do it in reverse order. You must remove the *receive* intervals first and then the *transmit* intervals.



**Task ID**

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

**Examples**

The following example shows how to enable a default Link Aggregation Control Protocol (LACP) short period on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short
RP/0/RP0/CPU0:router(config-if)# commit
```

The following example shows how to configure custom Link Aggregation Control Protocol (LACP) short period transmit and receive intervals at both ends of a connection:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0/CPU0:router(config-if)# commit
```

**Related Commands**

| Command                                   | Description                                                                                                          |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <a href="#">show lacp io, on page 798</a> | Displays the LACP transmission information that used by the transmitting device for sending packets on an interface. |

| Command                                               | Description                                                                       |
|-------------------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">show lacp packet-capture, on page 801</a> | Displays the contents of LACP packets that are sent and received on an interface. |
| <a href="#">lacp packet-capture, on page 769</a>      | Captures LACP packets so that their information can be displayed.                 |

# lACP system priority

To configure the priority for the current system, enter the **lACP system priority** command in global configuration mode. To return to the default LACP system priority value, use the **no** form of this command.

**no lACP system priority** *priority*

## Syntax Description

|          |                                                                                                                                   |
|----------|-----------------------------------------------------------------------------------------------------------------------------------|
| <i>s</i> | Priority for this system. Replace <i>priority</i> with a number. Range is from 1 through 65535. A lower value is higher priority. |
|----------|-----------------------------------------------------------------------------------------------------------------------------------|

## Command Default

*priority*: 32768

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The system priority value forms part of the LACP system ID, which is transmitted within each LACP packet. The system ID, port ID and key combine to uniquely define a port within a LACP system.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

## Examples

The following example shows how to configure an LACP priority of 100 on a router:

```
RP/0/RP0/CPU0:router(config)# lACP system priority 100
```

## Related Commands

| Command                                                           | Description                                    |
|-------------------------------------------------------------------|------------------------------------------------|
| <a href="#">show lACP system-id</a> , <a href="#">on page 807</a> | Displays the local system ID used by the LACP. |

| Command                                       | Description                                                     |
|-----------------------------------------------|-----------------------------------------------------------------|
| <a href="#">show lacp bundle, on page 793</a> | Displays detailed information about LACP ports and their peers. |
| <a href="#">show lacp port, on page 804</a>   |                                                                 |

# show bundle

To display information about all bundles or a specific bundle of a particular type, use the **show bundle** command in EXEC configuration mode.

**show bundle** [{**Bundle-Ether** | **Bundle-POS** }*bundle-id*]

## Syntax Description

|                     |                                                             |
|---------------------|-------------------------------------------------------------|
| <b>Bundle-Ether</b> | Displays information for the specified Ethernet bundle.     |
| <b>Bundle-POS</b>   | Displays information for the specified POS bundle.          |
| <i>bundle-id</i>    | Number from 1 to 65535 that identifies a particular bundle. |

## Command Default

Information is displayed for all configured bundles.

## Command Modes

EXEC (#)

## Command History

| Release       | Modification                                                                                                                                |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.2   | This command was introduced.                                                                                                                |
| Release 3.3.0 | <ul style="list-style-type: none"><li>• The output for this command was modified.</li><li>• The <b>reasons</b> keyword was added.</li></ul> |
| Release 4.0.0 | The output for this command was replaced with a new format.                                                                                 |
| Release 4.1.0 | <p>The following output fields were added:</p> <ul style="list-style-type: none"><li>• Load-balancing</li><li>• Cisco extensions</li></ul>  |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To see information for all bundles configured on the router, use the **show bundle** form of the command.

To see information for a specific bundle, use the **show bundle Bundle-Ether***bundle-id* or **show bundle Bundle-POS***bundle-id* form of the command with the number of the configured bundle.

## Task ID

| Task ID | Operation |
|---------|-----------|
| bundle  | read      |

## Examples

The following example shows output for all bundle interfaces that are configured on the router:

```
RP/0/RP0/CPU0:router# show bundle
Sun Mar 6 12:16:25.601 PST
```

```
Bundle-Ether10
 Status: Up
 Local links <active/standby/configured>: 1 / 1 / 2
 Local bandwidth <effective/available>: 1000000 (1000000) kbps
 MAC address (source): f866.f213.25a8 (Gi0/1/0/16)
 Minimum active links / bandwidth: 1 / 1 kbps
 Maximum active links: 1
 Wait while timer: 2000 ms
 Load balancing: Default
 LACP: Operational
 Flap suppression timer: Off
 Cisco extensions: Disabled
 mLACP: Not configured
 IPv4 BFD: Not operational
 State: Off
 Fast detect: Enabled
 Start timer: Off
 Neighbor-unconfigured timer: Off
 Preferred min interval: 150 ms
 Preferred multiple: 3
 Destination address: Not Configured
```

| Port                                                      | Device | State   | Port ID        | B/W, kbps |
|-----------------------------------------------------------|--------|---------|----------------|-----------|
| Gi0/1/0/9                                                 | Local  | Active  | 0x0001, 0x0001 | 1000000   |
| Link is Active                                            |        |         |                |           |
| Gi0/1/0/10                                                | Local  | Standby | 0x0002, 0x0002 | 1000000   |
| Link is Standby due to maximum-active links configuration |        |         |                |           |

**Table 71: show bundle Field Descriptions**

| Field                     | Description                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Bundle- <i>typenumber</i> | Full name of the bundle interface, where <i>type</i> is Ether (Ethernet) or POS, followed by the configured <i>number</i> of the bundle. |

| Field                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status:                                  | <p>State of the bundle on the local device, with one of the following possible values:</p> <ul style="list-style-type: none"> <li>• Admin down—The bundle has been configured to be shut down.</li> <li>• Bundle shut—The bundle is holding all links in Standby state and will not support any traffic.</li> <li>• Down—The bundle is operationally down. It has no Active members on the local device.</li> <li>•</li> <li>•</li> <li>• Nak—The local and peer devices cannot resolve a configuration error.</li> <li>• Partner down—The partner system indicates that the bundle is unable to forward traffic at its end.</li> <li>• PE isolated—The bundle is isolated from the core.</li> <li>• Up—The bundle has Active members on this device.</li> </ul> |
| Local links <active/standby/configured>: | <p>The number of links on the device (from 0 to the maximum number of supported links for the bundle) in the format <math>x/y/z</math>, with the following values:</p> <ul style="list-style-type: none"> <li>• <math>x</math>—Number of links in Active state on the bundle.</li> <li>• <math>y</math>—Number of links in Standby state on the bundle.</li> <li>• <math>z</math>—Total number of links configured on the bundle.</li> </ul>                                                                                                                                                                                                                                                                                                                     |
| Local bandwidth <effective/available>:   | <p>Bandwidth characteristics on the bundle in kilobits per second (kbps) in the format <math>x/y</math>, with the following values:</p> <ul style="list-style-type: none"> <li>• <math>x</math>—Current bandwidth of the bundle (this effective bandwidth might be limited by configuration).</li> <li>• <math>y</math>—Available bandwidth of the bundle that is the sum of the bandwidths of all of the locally active links.</li> </ul>                                                                                                                                                                                                                                                                                                                       |

| Field                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAC address (source):             | <p>Layer 2 MAC address on the bundle interface in the format<br/>xxxx.xxxx.xxxx. The (<i>source</i>) of the address is shown in parentheses with the following possible values:</p> <ul style="list-style-type: none"> <li>Interface name—The MAC address is from the displayed member interface type and path.</li> <li>Configured—The MAC address is explicitly configured.</li> <li>Chassis pool—The MAC address is from the available pool of addresses for the chassis.</li> <li>[unknown MAC source 0]—No MAC address could be assigned to the bundle. (You might see this display if you have not completed your bundle configuration.)</li> </ul> |
| Minimum active links / bandwidth: | <p>Displays the following information in the format <i>x / y</i> kbps, with the following values:</p> <ul style="list-style-type: none"> <li><i>x</i>—Minimum number of active links (from 1 to the maximum number of links supported on the bundle) that are required for the bundle to be operative.</li> <li><i>y</i>—Minimum total bandwidth on active links (in kbps) that is required for the bundle to be operative.</li> <li>(partner)—Shows that the peer system's value is in use.</li> </ul>                                                                                                                                                   |
| Maximum active links:             | Maximum number of links (from 1 to the maximum supported on a bundle) that can be active on the bundle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Wait-while timer:                 | Amount of time (in milliseconds) that the system allows for the Link Aggregation Control Protocol (LACP) to negotiate on a “working” link, before moving a “protect” or backup link to Standby state.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Load balancing:                   | The default load balancing method for the system is used on the bundle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LACP:                   | <p>Displays whether or not Link Aggregation Control Protocol (LACP) is active on the bundle, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Operational—All required configuration has been committed and LACP is in use on active members.</li> <li>• Not operational—LACP is not working because some mandatory configuration is missing on the bundle or on the active members of the bundle.</li> <li>• Not configured—None of the mandatory configuration for LACP has been committed on the bundle, and the LACP sub-fields are not displayed.</li> </ul> |
| Flap suppression timer: | <p>Displays the status of the flap suppression timer, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Off—The flap suppression timer is not configured using the <b>lacp switchover suppress-flaps</b> command.</li> <li>• <i>x</i> ms—Amount of time allowed (in milliseconds) for standby links to activate after a working link fails, before putting the link in Down state.</li> </ul>                                                                                                                                                                      |
| Cisco extensions:       | <p>Displays whether or not the Cisco-specific TLVs for LACP are enabled. The possible values are Enabled or Disabled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| mLACP:                  | <p>mLACP is not supported on the platform.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IPv4 BFD:    | <p>Displays whether or not IPv4-based bidirectional forwarding (BFD) is operating on the bundle interface, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Operational—All required configuration has been committed for IPv4 BFD, and it is in use on the bundle.</li> <li>• Not operational—IPv4 BFD is not working because some mandatory configuration is missing on the bundle or on the active members of the bundle.</li> <li>• Not configured—None of the mandatory configuration for IPv4 BFD has been committed on the bundle, and the BFD sub-fields are not displayed.</li> </ul> |
| State:       | <p>When BFD is enabled, displays the state of BFD sessions on the bundle from the sessions running on bundle members that is communicated to interested protocols, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Down—The configured minimim threshold for active links or bandwidth for BFD bundle members is not available so BFD sessions are down.</li> <li>• Off—BFD is not configured on bundle members.</li> <li>• Up—BFD sessions on bundle members are up because the minimum threshold for the number of active links or bandwidth is met.</li> </ul>                             |
| Fast detect: | <p>Displays whether or not BFD fast detection is configured on the bundle, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Enabled—The <b>bfd fast-detect</b> command is configured on the bundle.</li> <li>• Disabled—The <b>bfd fast-detect</b> command is not configured on the bundle.</li> </ul>                                                                                                                                                                                                                                                                                         |

| Field                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start timer:                 | <p>Displays status of the BFD start timer that is configured using the <b>bfd address-family ipv4 timers start</b> command, with the following possible values:</p> <ul style="list-style-type: none"> <li>• <i>x s</i>—Number of seconds (from 60 to 3600) after startup of a BFD member link session to wait for the expected notification from the BFD peer to be received, so that the session can be declared up. If the SCN is not received after that period of time, the BFD session is declared down.</li> <li>• Off—The start timer is not configured, and a BFD session is only declared Down upon notification from the BFD server.</li> </ul>                                                                              |
| Neighbor-unconfigured timer: | <p>Displays status of the BFD start timer that is configured using the <b>bfd address-family ipv4 timers nbr-unconfig</b> command, with the following possible values:</p> <ul style="list-style-type: none"> <li>• <i>x s</i>—Number of seconds (from 60 to 3600) to wait after receipt of notification that the BFD configuration has been removed by a BFD neighbor, so that any configuration inconsistency between the BFD peers can be fixed. If the BFD configuration issue is not resolved before the specified timer is reached, the BFD session is declared down.</li> <li>• Off—The neighbor-unconfigured timer is not configured, and a BFD session is only declared Down upon notification from the BFD server.</li> </ul> |
| Preferred min interval:      | Number of milliseconds (in the format <i>x ms</i> ) as the minimum control packet interval for BFD sessions. The range is 15 to 30000.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Preferred multiple:          | Value of the multiplier (from 2 to 50) that is used for echo failure detection, which specifies the maximum number of echo packets that can be missed before a BFD session is declared Down.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Destination address:         | Destination IP address for BFD sessions on bundle member links that is configured using the <b>bfd address-family ipv4 destination</b> command. “Not configured” is displayed when no destination IP address is configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port         | Name of the local interface port that is configured to be a bundle member. The possible values are the shortened interface name or a text string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Device       | Label Distribution Protocol (LDP) address of the device where the interface port is located, with the following possible values: <ul style="list-style-type: none"> <li>• <i>address</i>—IP address of the device.</li> <li>• Local—Interface port is on the local device.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| State        | Status of the port, with one of the following possible values: <ul style="list-style-type: none"> <li>• Active—Link can send and receive traffic.</li> <li>• BFD Running—Link is inactive because BFD is down or has not been fully negotiated.</li> <li>• Configured—Link is not operational or remains down due to a configuration mismatch. The link is not available for switchover from failure of an active link.</li> <li>• Hot Standby—Link is ready to take over if an active link fails and can immediately transition to Active state without further exchange of LACP protocol data units (PDUs).</li> <li>• Negotiating—Link is in the process of LACP negotiation and is being held in a lower LACP state by the peer (for example, because the link is Standby on the peer.)</li> <li>• Standby—Link is not sending or receiving traffic, but is available for switchover from failure of an active link.</li> </ul> |
| Port ID      | ID of the interface port in the format <i>x/y</i> , with the following values: <ul style="list-style-type: none"> <li>• <i>x</i>—Port priority as a 2-byte hexadecimal value.</li> <li>• <i>y</i>—Link ID as a 2-byte hexadecimal value.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| B/W, kbps    | Bandwidth of the interface port in kilobits per second.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| State reason | Text string that is displayed beneath the bundle member listing explaining why a link has not reached Active state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

**Table 72: State Reasons**

| Reason                                                               | Description                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BFD session is unconfigured on the remote end                        | The link is in BFD Running state because LACP is negotiated but the BFD session from the remote device has been unconfigured.                                                                                                                                  |
| BFD state of this link is Down                                       | The link is in BFD Running state because LACP is negotiated but the BFD session between the local system and the remote device is Down.                                                                                                                        |
| Bundle has been shut down                                            | The link is in Configured state because the bundle it is configured as a member of is administratively down.                                                                                                                                                   |
| Bundle interface is not present in configuration                     | The link is in Configured state because the bundle it is configured as a member of has not itself been configured.                                                                                                                                             |
| Bundle is in the process of being created                            | The link is in Configured state because the bundle it is configured as a member of is still being created.                                                                                                                                                     |
| Bundle is in the process of being deleted                            | The link is in Configured state because the bundle it is configured as a member of is being deleted.                                                                                                                                                           |
| Bundle is in the process of being replicated to this location        | The link is in Configured state because the bundle it is configured as a member of is still being replicated to the linecard where the link is located.                                                                                                        |
| Forced switchover to the mLACP peer                                  | The link is in Configured state because it has been brought down as part of a forced switchover to the mLACP peer PoA. This happens only when brute force switchovers are configured.                                                                          |
| ICCP group is isolated from the core network                         | The link is in Configured state because there is no connectivity through the network core for the ICCP group that the link and its bundle are part of. Therefore, the link has been brought down to prevent any traffic being sent by the LACP partner device. |
| Incompatible with other links in the bundle (bandwidth out of range) | The link is in Configured state because its bandwidth is incompatible with other links configured to be in the same bundle. The bandwidth may be too high or too low.                                                                                          |
| LACP shutdown is configured for the bundle                           | The link is in Standby state because the bundle is configured with LACP shutdown.                                                                                                                                                                              |

| Reason                                                             | Description                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incompatible with other links in the bundle (LACP vs non-LACP)     | The link is in Configured state because its use of LACP is incompatible with other links configured in the same bundle. Some links might be running LACP while others are not.                                                                                                           |
| Link is Attached and has not gone Collecting (reason unknown)      | The link is in Negotiating state because the mLACP peer PoA has not indicated that the link has gone Collecting in the Mux machine. This could be because of an issue between the mLACP peer and its LACP partner or because this state has not been communicated to the local system.   |
| Link is Collecting and has not gone Distributing (reason unknown)  | The link is in Negotiating state because the mLACP peer PoA has not indicated that the link has gone Distributing in the Mux machine. This could be because of an issue between the mLACP peer and its LACP partner or because this state has not been communicated to the local system. |
| Link is being removed from the bundle                              | The link is being removed from the bundle and remains in Configured state while this happens.                                                                                                                                                                                            |
| Link is Defaulted; LACPDUs are not being received from the partner | The link is in Configured state because no LACPDUs are being received from the LACP partner device. Either the partner is not transmitting or the packets are getting lost.                                                                                                              |
| Link is down                                                       | The link is in Configured state because it is operationally or administratively down.                                                                                                                                                                                                    |
| Link is Expired; LACPDUs are not being received from the partner   | The link is in Negotiating state because no LACPDUs have been received from the LACP Partner device in the Current-While period and the link is now marked as Expired in the Receive machine.                                                                                            |
| Link is in the process of being created                            | The link is in Configured state because the member configuration is still being processed.                                                                                                                                                                                               |
| Link is marked as Standby by mLACP peer                            | The link is in Standby state because this has been indicated by the mLACP peer PoA.                                                                                                                                                                                                      |
| Link is Not Aggregatable (reason unknown)                          | The link is in Configured state because it is marked as an Individual link by the mLACP peer PoA.                                                                                                                                                                                        |
| Link is not operational as a result of mLACP negotiations          | mLACP negotiations with the peer have led to this link being kept in Configured state. This is likely to indicate a misconfiguration between the two peer devices.                                                                                                                       |

| Reason                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Link is Standby; bundle has more links than are supported           | The link is in Standby state because the number of links in Selected state has already reached the hard platform limit on the number of active links.                                                                                                                                                                                                                                          |
| Link is Standby due to maximum-active links configuration           | The link is in Standby state because the number of links in Selected state has already reached the configured maximum active links threshold.                                                                                                                                                                                                                                                  |
| Link is waiting for BFD session to start                            | The link is in BFD Running state because LACP is negotiated but the BFD session has not started from the remote device.                                                                                                                                                                                                                                                                        |
| Loopback: Actor and Partner have the same System ID and Key         | The link is in Configured state because a loopback condition has been detected on the link—two links configured to be members of the bundle are actually connected to each other.                                                                                                                                                                                                              |
| Not enough links available to meet minimum-active threshold         | The link is in Standby state because there are not enough selectable links (i.e. links which meet the criteria to be marked Selected within the bundle) to meet the minimum active links/bandwidth threshold.                                                                                                                                                                                  |
| Partner has marked the link as Not Aggregatable                     | The link is in Configured state because it is marked as an Individual link by the LACP partner device.                                                                                                                                                                                                                                                                                         |
| Partner has not advertised that it is Collecting                    | The link is in Negotiating state because the LACP partner device has not advertised that the link is in Collecting state in its LACPDUs.                                                                                                                                                                                                                                                       |
| Partner has not echoed the correct parameters for this link         | The link is in Negotiating state because the LACP partner device has not correctly echoed the local system's port information in the LACPDUs it is sending.                                                                                                                                                                                                                                    |
| Partner is not Synchronized (Waiting, not Selected, or out-of-date) | The link is in Negotiating state because the mLACP peer PoA has not indicated that its LACP partner device is Synchronized. This could be because the devices are genuinely not Synchronized or because this state has not been communicated to the local system.                                                                                                                              |
| Partner is not Synchronized (Waiting, Standby, or LAG ID mismatch)  | The link is in Negotiating state because the LACP partner device has not indicated that it is Synchronized in the LACPDUs it is sending. On the partner device the link could still be waiting for the Wait-While timer to expire, it could be held in Standby state, or there could be a misconfiguration leading to a LAG ID mismatch between links configured to be within the same bundle. |

| Reason                                                        | Description                                                                                                                                                                                                                        |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Partner System ID/Key do not match that of the Selected links | The link is in Configured state because the System ID or Operational Key specified by the LACP partner device does not match that seen on other Selected links within the same bundle. This probably indicates a misconfiguration. |
| Wait-while timer is running                                   | The link is in Configured state because the Wait-While timer is still running and the new state has not yet been determined.                                                                                                       |

**Related Commands**

| Command                                          | Description                                                                                |
|--------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">interface (bundle)</a> , on page 765 | Specifies or creates a new bundle and enters interface configuration mode for that bundle. |



# show bundle brief

To display summary information about all configured bundles, use the **show bundle brief** command in EXEC configuration mode.

**show bundle brief**

**Syntax Description** This command has no keywords or arguments.

**Command Default** Information for all configured bundles is displayed.

**Command Modes** EXEC (#)

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Operation |
|---------|-----------|
| bundle  | read      |

**Examples** The following examples shows the status of two bundles, BE16 and BE100, that are configured on the router. Both are Ethernet bundles and only bundle 16 is Up:

```
RP/0/RP0/CPU0:router# show bundle brief
Thu Mar 3 14:40:35.167 PST
```

| Name  | IG | State | LACP | BFD | Links<br>act/stby/cfgd | Local b/w,<br>kbps |
|-------|----|-------|------|-----|------------------------|--------------------|
| BE16  |    | Up    | On   | Off | 1 / 1 / 2              | 1000000            |
| BE100 |    | Down  | Off  | Off | 0 / 0 / 0              | 0                  |

[Table 73: show bundle brief Field Descriptions, on page 790](#) describes the fields shown in the display.

**Table 73: show bundle brief Field Descriptions**

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name  | Abbreviated name of the bundle interface, with the following possible formats: <ul style="list-style-type: none"> <li>• BEx—Ethernet bundle with ID number <i>x</i>.</li> <li>• BPy—POS bundle with ID number <i>y</i>.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| IG    | Interchassis group ID (if configured) of which the bundle is a member.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| State | State of the bundle on the local device, with the following possible values: <ul style="list-style-type: none"> <li>• Admin down—The bundle has been configured to be shut down.</li> <li>• Bundle shut—The bundle is holding all links in Standby state and will not support any traffic.</li> <li>• Down—The bundle is operationally down. It has no Active members on the local device.</li> <li>•</li> <li>•</li> <li>• Nak—The local and peer devices cannot resolve a configuration error.</li> <li>• Partner down—The partner system indicates that the bundle is unable to forward traffic at its end.</li> <li>• PE isolated—The bundle is isolated from the core.</li> <li>• Up—The bundle has Active members on this device.</li> </ul> |
| LACP  | Status of the Link Aggregation Control Protocol (LACP) on the bundle, with the following possible values: <ul style="list-style-type: none"> <li>• On—LACP is in use on the bundle.</li> <li>• Off—LACP is not active.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Field               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BFD                 | <p>When BFD is enabled, displays the state of BFD sessions on the bundle from the sessions running on bundle members that is communicated to interested protocols, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Down—The configured minimum threshold for active links or bandwidth for BFD bundle members is not available so BFD sessions are down.</li> <li>• Off—BFD is not configured on bundle members.</li> <li>• Up—BFD sessions on bundle members are up because the minimum threshold for the number of active links or bandwidth is met.</li> </ul>                                      |
| Links act/stby/cfgd | <p>Number of links on the bundle with a particular status in the format <i>x/y/z</i>, with the following values:</p> <ul style="list-style-type: none"> <li>• <i>x</i>—Number of links in Active state on the bundle for the local device (from 1 to the maximum number of links supported on the bundle).</li> <li>• <i>y</i>—Number of links in Standby state on the bundle for the local device (from 1 to the maximum number of links supported on the bundle).</li> <li>• <i>z</i>—Total number of links configured on the bundle for the local device (from 1 to the maximum number of links supported on the bundle).</li> </ul> |
| Local b/w, kbps     | Current bandwidth of the bundle on the local device (this effective bandwidth might be limited by configuration).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Related Commands**

| Command                                                   | Description                                    |
|-----------------------------------------------------------|------------------------------------------------|
| <a href="#">show bundle</a> , <a href="#">on page 777</a> | Displays information about configured bundles. |

# show bundle replication bundle-ether

To display the replication status of a link bundle interface, use the **show bundle replication bundle-ether** command in EXEC mode.

**show bundle replication bundle-ether** *bundle\_id* [**all**] [**in-progress**] [**pending**]

## Syntax Description

|                    |                                                |
|--------------------|------------------------------------------------|
| <b>all</b>         | Shows replication status for all nodes.        |
| <b>in-progress</b> | Shows only nodes with replication in progress. |
| <b>pending</b>     | Shows only nodes pending replication.          |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

## Examples

The following example shows how to

```
RP/0/RP0/CPU0:router# show bundle replication bundle-ether 1 all
```

# show lacp bundle

To display detailed information about Link Aggregation Control Protocol (LACP) ports and their peers, enter the **show lacp bundle** command in EXEC mode.

**show lacp bundle** [**Bundle-Ether**| **bundle-POS**] *bundle-id*

## Syntax Description

|                                      |                                                                                                                         |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Bundle-Ether</b> <i>bundle-id</i> | (Optional) Specifies the number of the Ethernet bundle whose information you want to display. Range is 1 through 65535. |
| <b>Bundle-POS</b> <i>bundle-id</i>   | (Optional) Specifies the number of the POS bundle whose information you want to display. Range is 1 through 65535.      |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

## Examples

The following example shows how to display LACP information for a specific Ethernet Bundle:

```
RP/0/RP0/CPU0:router# show lacp bundle Bundle-Ether 1
```

```
Flags: A - Device is in Active mode. P - Device is in Passive mode.
 S - Device sends PDUs at slow rate. F - Device sends PDUs at fast rate.
 D - Port is using default values for partner information
 E - Information about partner has expired
State: 0 - Port is Not Aggregatable. 1 - Port is Out Of Sync with peer.
 2 - Port is In Sync with peer. 3 - Port is Collecting.
 4 - Port is Collecting and Distributing.
```

## show lacp bundle

```

Bundle-Ether1
 B/W (Kbps) MAC address Minimum active Maximum active
 ----- -
 Links B/W (Kbps) Links
 --- -
 1 620000 32

 Port State Flags Port ID Key System-ID
 ----- -
 Gi0/0/2/0 1 ASDE 0x8000, 0x0001 0x0001 0x8000, 08-00-45-3a-65-01
 PEER 0 PSD 0xffff, 0x0000 0x0000 0xffff, 00-00-00-00-00-00

```

Table 74: show lacp bundle Field Descriptions

| Field   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flags   | Describes the possible flags that may apply to a device or port, under the “Flags” field.                                                                                                                                                                                                                                                                                                                                                                              |
| State   | Describes the possible flags that may apply the port state, under the “State” field.                                                                                                                                                                                                                                                                                                                                                                                   |
| Port    | Port identifier, in the <i>rack/slot/module/port</i> notation.                                                                                                                                                                                                                                                                                                                                                                                                         |
| State   | Provides information about the state of the specified port. Possible flags are: <ul style="list-style-type: none"> <li>• 0—Port is not aggregatable.</li> <li>• 1—Port is out of sync with peer.</li> <li>• 2—Port is in sync with peer.</li> <li>• 3—Port is collecting.</li> <li>• 4—Port is collecting and distributing.</li> </ul>                                                                                                                                 |
| Flags   | Provides information about the state of the specified device or port. Possible flags are: <ul style="list-style-type: none"> <li>• A—Device is in Active mode.</li> <li>• P—Device is in Passive mode.</li> <li>• S—Device requests peer to send PDUs at a slow rate.</li> <li>• F—Device requests peer to send PDUs at a fast rate.</li> <li>• D—Port is using default values for partner information.</li> <li>• E—Information about partner has expired.</li> </ul> |
| Port ID | Port identifier, expressed in the format <i>Nxnnnn</i> . <i>N</i> is the port priority, and <i>nnnn</i> is the port number assigned by the sending router.                                                                                                                                                                                                                                                                                                             |

| Field     | Description                                                                                                                                                                                                                                                                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Key       | Two-byte number associated with the specified link and aggregator. Each port is assigned an operational key. The ability of one port to aggregate with another is summarized by this key. Ports which have the same key select the same bundled interface. The system ID, port ID and key combine to uniquely define a port within a LACP system. |
| System-ID | System identifier. The system ID is a LACP property of the system which is transmitted within each LACP packet together with the details of the link.                                                                                                                                                                                             |

**Related Commands**

| Command                                  | Description                                       |
|------------------------------------------|---------------------------------------------------|
| <a href="#">bundle id, on page 752</a>   | Adds a port to an aggregated interface or bundle. |
| <a href="#">show bundle, on page 777</a> | Displays information about configured bundles.    |

# show lacp counters

To display Link Aggregation Control Protocol (LACP) statistics, enter the **show lacp counters** command in EXEC mode.

**show lacp counters** {**Bundle-Ether**| **bundle-POS**} *bundle-id*

## Syntax Description

|                                      |                                                                                                                                                     |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bundle-Ether</b> <i>bundle-id</i> | Specifies the Ethernet bundle whose counters you want to display. Replace <i>bundle-id</i> with a bundle identifier. Range is from 1 through 65535. |
| <b>Bundle-POS</b> <i>bundle-id</i>   | Specifies the POS bundle whose counters you want to display. Replace <i>bundle-id</i> with a bundle identifier. Range is from 1 through 65535.      |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

## Examples

The following example shows how to display LACP counters on an Ethernet bundle:

```
RP/0/RP0/CPU0:router# show lacp counters bundle-ether 1
```

```
Bundle-Ether1
```

| Port      | LACPDUs |          | Marker   |            | Last Cleared |
|-----------|---------|----------|----------|------------|--------------|
|           | Sent    | Received | Received | Resp. Sent |              |
| Gi0/0/2/0 | 12      | 0        | 0        | 0          | never        |

  

| Port  | Excess | Excess | Pkt Errors |
|-------|--------|--------|------------|
| ----- | -----  | -----  | -----      |



0

| Field  | Description                                                                                                                                                                                                                                                                                                                                                                                         |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LACPDU | <p>Provides the following statistics for Link Aggregation Control Protocol data units (LACPDU):</p> <ul style="list-style-type: none"> <li>• Port</li> <li>• Sent</li> <li>• Received</li> <li>• Last Cleared</li> <li>• Excess</li> <li>• Pkt Errors</li> </ul>                                                                                                                                    |
| Marker | <p>Provides the following statistics for marker packets:</p> <ul style="list-style-type: none"> <li>• Received</li> <li>• Resp. Sent</li> <li>• Last Cleared</li> <li>• Excess</li> <li>• Pkt Errors</li> </ul> <p><b>Note</b>     The Marker Protocol is used by IEEE 802.3ad bundles to ensure that data no longer is transmitted on a link when a flow is redistributed away from that link.</p> |

| Command                                        | Description                                                                                                    |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <code>clear lacp counters</code> , on page 763 | Clears LACP counters for all members of all bundles, all members of a specific bundle, or for a specific port. |

# show lacp io

To display the Link Aggregation Control Protocol (LACP) transmission information that used by the transmitting device for sending packets on an interface, use the **show lacp io** command in EXEC mode.

**show lacp io** {**Bundle-Ether**| **bundle-POS**} *bundle-id* {**GigabitEthernet**| **POS**| **TenGigE**} *interface-path-id*

## Syntax Description

|                                      |                                                                                                                                                                                                                                                                                 |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bundle-Ether</b> <i>bundle-id</i> | (Optional) Displays information for the Ethernet bundle interface with the specified <i>bundle-id</i> . The range is 1 through 65535.                                                                                                                                           |
| <b>Bundle-POS</b> <i>bundle-id</i>   | (Optional) Displays information for the POS bundle interface with the specified <i>bundle-id</i> . The range is 1 through 65535.                                                                                                                                                |
| <b>GigabitEthernet</b>               | (Optional) Displays information for the Gigabit Ethernet interface with the specified <i>interface-path-id</i> .                                                                                                                                                                |
| <b>TenGigE</b>                       | (Optional) Displays information for the Ten Gigabit Ethernet interface with the specified <i>interface-path-id</i> .                                                                                                                                                            |
| <b>POS</b>                           | (Optional) Displays information for the POS interface with the specified <i>interface-path-id</i> .                                                                                                                                                                             |
| <i>interface-path-id</i>             | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

The default takes no parameters and displays information for all actively transmitting interfaces.

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command displays information only for interfaces that are actively transmitting packets.

**Task ID**

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

**Examples**

The following example shows how to display Link Aggregation Control Protocol (LACP) information for the Ethernet bundle interface with bundle ID 28.

```
RP/0/RP0/CPU0:router# show lacp io bundle-ether 28
```

```
Thu Jun 18 16:28:54.068 PST
```

```
Bundle-Ether28
```

```
Interface GigabitEthernet0/1/5/6
=====
Interface handle: 0x01180100
Interface media type: Ethernet
Fast periodic interval: 1000ms
Source MAC address: 0015.63c0.b3b8
Actor system: 0x8000, 00-15-63-c0-b0-04
Actor key: 0x001c
Actor port: 0x8000, 0x0001
Actor state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key: 0x001c
Partner port: 0x0001, 0x0003
Partner state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)

Interface GigabitEthernet0/1/5/7
=====
Interface handle: 0x01180120
Interface media type: Ethernet
Fast periodic interval: 1000ms
Source MAC address: 0015.63c0.b3b9
Actor system: 0x8000, 00-15-63-c0-b0-04
Actor key: 0x001c
Actor port: 0x8000, 0x0002
Actor state: Act (T/o) Agg Sync (Coll) (Dist) (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key: 0x001c
Partner port: 0x0002, 0x0004
Partner state: Act (T/o) Agg (Sync) (Coll) (Dist) (Def) (Exp)
```

The following example shows how to display Link Aggregation Control Protocol (LACP) information for all actively transmitting interfaces:

```
RP/0/RP0/CPU0:router# show lacp io
```

```
Thu Jun 18 16:33:57.330 PST
```

```
Bundle-Ether28
```

```
Interface GigabitEthernet0/1/5/6
=====
Interface handle: 0x01180100
Interface media type: Ethernet
Fast periodic interval: 1000ms
Source MAC address: 0015.63c0.b3b8
Actor system: 0x8000, 00-15-63-c0-b0-04
Actor key: 0x001c
Actor port: 0x8000, 0x0001
Actor state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)
```

**show lacp io**

```

Partner system: 0x8000, 00-15-63-58-b9-04
Partner key: 0x001c
Partner port: 0x0001, 0x0003
Partner state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)

```

```

Interface GigabitEthernet0/1/5/7
=====

```

```

Interface handle: 0x01180120
Interface media type: Ethernet
Fast periodic interval: 1000ms
Source MAC address: 0015.63c0.b3b9
Actor system: 0x8000, 00-15-63-c0-b0-04
Actor key: 0x001c
Actor port: 0x8000, 0x0002
Actor state: Act (T/o) Agg Sync (Coll) (Dist) (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key: 0x001c
Partner port: 0x0002, 0x0004
Partner state: Act (T/o) Agg (Sync) (Coll) (Dist) (Def) (Exp)

```

```

Bundle-POS24

```

```

Interface POS0/1/4/0
=====

```

```

Interface handle: 0x011804c0
Interface media type: POS
Fast periodic interval: 1000ms
Actor system: 0x8000, 00-15-63-c0-b0-04
Actor key: 0x0018
Actor port: 0x8000, 0x0003
Actor state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key: 0x0018
Partner port: 0x8000, 0x0001
Partner state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)

```

```

Interface POS0/1/4/1
=====

```

```

Interface handle: 0x011804e0
Interface media type: POS
Fast periodic interval: 1000ms
Actor system: 0x8000, 00-15-63-c0-b0-04
Actor key: 0x0018
Actor port: 0x8000, 0x0004
Actor state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key: 0x0018
Partner port: 0x8000, 0x0002
Partner state: Act (T/o) Agg Sync Coll Dist (Def) (Exp)

```

**Related Commands**

| Command                                               | Description                                                                              |
|-------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show lacp packet-capture, on page 801</a> | Displays the contents of LACP packets that are sent and received on an interface.        |
| <a href="#">lacp period short, on page 772</a>        | Enables a short period time interval for the transmission and reception of LACP packets. |
| <a href="#">lacp packet-capture, on page 769</a>      | Captures LACP packets so that their information can be displayed.                        |

# show lacp packet-capture

To display the contents of Link Aggregation Control Protocol (LACP) packets that are sent and received on an interface, use the **show lacp packet-capture** command in EXEC mode.

**show lacp packet-capture** [**decoded**] [**in**|**out**] {**GigabitEthernet**|**POS**|**TenGigE**} *interface-path-id*

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>decoded</b>           | (Optional) Displays packet information in decoded form for the specified interface.                                                                                                                                                                                             |
| <b>in</b>                | (Optional) Displays packet information for ingress packets only.                                                                                                                                                                                                                |
| <b>out</b>               | (Optional) Displays packet information for egress packets only.                                                                                                                                                                                                                 |
| <b>GigabitEthernet</b>   | Displays packet information for the Gigabit Ethernet interface specified by <i>interface-path-id</i> .                                                                                                                                                                          |
| <b>POS</b>               | Displays packet information for the POS interface specified by <i>interface-path-id</i> .                                                                                                                                                                                       |
| <b>TenGigE</b>           | Displays packet information for the Ten Gigabit Ethernet interface specified by <i>interface-path-id</i> .                                                                                                                                                                      |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

The default displays both in and out information.

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

**Note**

The **lacp packet-capture** command captures transmit and receive packets on a single interface. The contents of these packets can then be displayed by the **show lacp packet-capture** command. If the **lacp packet-capture** command is not issued, the **show lacp packet-capture** command does not display any information.

**Task ID**

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

**Examples**

The following example shows how to display the contents of an LACP packet, in hexadecimal, for a Gigabit Ethernet interface:

**Note**

In the following example, after you issue the **lacp packet-capture** command, you must wait for a reasonable amount of time for the system to capture packets that are sent and received on the interface before you issue the **show lacp packet-capture** command. Otherwise, there is no information to display.

```
RP/0/RP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RP0/CPU0:router# show lacp packet-capture gigabitethernet 0/1/0/0

Wed Apr 29 16:27:40.996 GMT
OUT Apr 29 17:05:50.123
=====
01 01 01 14 80 00 02 a7 4c 81 95 04 00 01 80 00 00 01 45 00
00 00 02 14 ff ff 00 00 00 00 00 00 00 00 00 ff ff 00 00 40 00
00 00 03 10 ff ff 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00

OUT Apr 29 17:35:50.124
=====
...
```

The following example shows how to display the LACP parameters, decoded from individual packets, transmitted and received on a Gigabit Ethernet interface:

**Note**

In the following example, after you issue the **lacp packet-capture** command, you must wait for a reasonable amount of time for the system to capture packets that are sent and received on the interface before you issue the **show lacp packet-capture** command. Otherwise, there is no information to display.

```
RP/0/RP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RP0/CPU0:router# show lacp packet-capture decoded gigabitethernet 0/1/0/0

Wed Apr 29 16:27:54.748 GMT
OUT Apr 29 17:06:03.008
=====
Subtype: 0x01 - LACP Version: 1
```

```
TLV: 0x01 - Actor Information Length: 20
System: Priority: 32768, ID: 02-a7-4c-81-95-04
Key: 0x0001, Port priority: 32768, Port ID: 1
State: Act (T/o) Agg (Sync) (Coll) (Dist) Def (Exp)

TLV: 0x02 - Partner Information Length: 20
System: Priority: 65535, ID: 00-00-00-00-00-00
Key: 0x0000, Port priority: 65535, Port ID: 0
State: (Act) (T/o) (Agg) (Sync) (Coll) (Dist) Def (Exp)

TLV: 0x03 - Collector Information Length: 16
Max delay: 65535

TLV: 0x00 - Terminator Length: 0
```

**Related Commands**

| Command                                          | Description                                                                                                          |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <a href="#">show lacp io, on page 798</a>        | Displays the LACP transmission information that used by the transmitting device for sending packets on an interface. |
| <a href="#">lacp period short, on page 772</a>   | Enables a short period time interval for the transmission and reception of LACP packets.                             |
| <a href="#">lacp packet-capture, on page 769</a> | Captures LACP packets so that their information can be displayed.                                                    |

# show lacp port

To display detailed information about Link Aggregation Control Protocol (LACP) ports, enter the **show lacp port** command in EXEC mode.

**show lacp port** [[GigabitEthernet| POS| TenGigE] *interface\_instance*]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GigabitEthernet</b>   | (Optional) Gigabit Ethernet interface. Use the <i>interface-path-id</i> argument to specify the Gigabit Ethernet interface whose LACP counters you want to display.                                                                                                             |
| <b>TenGigE</b>           | (Optional) Ten Gigabit Ethernet interface. Use the <i>interface-path-id</i> argument to specify the Ten Gigabit Ethernet interface whose LACP counters you want to display.                                                                                                     |
| <b>POS</b>               | (Optional) Packet-over-SONET/SDH (POS) interface. Use the <i>interface-path-id</i> argument to specify the POS interface whose LACP counters you want to display.                                                                                                               |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No default behavior or values.

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, if specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the line card.
- *module*: Module number. A physical layer interface module (PLIM) is always 0.



- *port*: Physical port number of the interface.

**Task ID**

| Task ID | Operations |
|---------|------------|
| bundle  | read       |

**Examples**

The following example shows how to display LACP port information for all link bundles on a router:

```
RP/0/RP0/CPU0:router# show lacp port
```

```
Flags: A - Device is in Active mode. P - Device is in Passive mode.
 S - Device sends PDUs at slow rate. F - Device sends PDUs at fast rate.
 D - Port is using default values for partner information
 E - Information about partner has expired
State: 0 - Port is Not Aggregatable. 1 - Port is Out Of Sync with peer.
 2 - Port is In Sync with peer. 3 - Port is Collecting.
 4 - Port is Collecting and Distributing.
```

```
Bundle-Ether1
```

| B/W (Kbps) | MAC address    | Minimum active Links | B/W (Kbps) | Maximum active Links |
|------------|----------------|----------------------|------------|----------------------|
| 0          | 0800.453a.651d | 1                    | 620000     | 32                   |

  

| Port      | State | Flags | Port ID        | Key    | System-ID                 |
|-----------|-------|-------|----------------|--------|---------------------------|
| Gi0/0/2/0 | 1     | ASDE  | 0x8000, 0x0001 | 0x0001 | 0x8000, 08-00-45-3a-65-01 |
| PEER      | 0     | PSD   | 0xffff, 0x0000 | 0x0000 | 0xffff, 00-00-00-00-00-00 |

**Table 76: show lacp port Field Descriptions**

| Field | Description                                                                                                                                                                                                                                                                                                                                      |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port  | Identifies the LACP port whose information is displayed. The port number is expressed in the <i>rack/slot/module/port</i> notation.                                                                                                                                                                                                              |
| State | Provides information about the state of the specified device or port. Possible flags are: <ul style="list-style-type: none"> <li>• 0—Port is not aggregatable.</li> <li>• 1—Port is out of sync with peer.</li> <li>• 2—Port is in sync with peer.</li> <li>• 3—Port is collecting.</li> <li>• 4—Port is collecting and distributing.</li> </ul> |

| Field     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flags     | <p>Provides information about the state of the specified port. Possible flags are:</p> <ul style="list-style-type: none"> <li>• A—Device is in Active mode.</li> <li>• P—Device is in Passive mode.</li> <li>• S—Device requests peer to send PDUs at a slow rate.</li> <li>• F—Device requests peer to send PDUs at a fast rate.</li> <li>• D—Port is using default values for partner information.</li> <li>• E—Information about partner has expired.</li> </ul> |
| Port ID   | <p>Port identifier, expressed in the following format: <i>Nxnnnn</i>. <i>N</i> is the port priority, and <i>nnnn</i> is the port number assigned by the sending router.</p>                                                                                                                                                                                                                                                                                         |
| Key       | <p>Two-byte number associated with the specified link and aggregator. Each port is assigned an operational key. The ability of one port to aggregate with another is summarized by this key. Ports which have the same key select the same bundled interface. The system ID, port ID and key combine to uniquely define a port within a LACP system.</p>                                                                                                            |
| System-ID | <p>System identifier. The System ID is an LACP property of the system which is transmitted within each LACP packet together with the details of the link.</p>                                                                                                                                                                                                                                                                                                       |

**Related Commands**

| Command                                        | Description                                                     |
|------------------------------------------------|-----------------------------------------------------------------|
| <a href="#">bundle id</a> , on page 752        | Adds a port to an aggregated interface or bundle.               |
| <a href="#">show bundle</a> , on page 777      | Displays information about configured bundles.                  |
| <a href="#">show lacp bundle</a> , on page 793 | Displays detailed information about LACP ports and their peers. |

# show lacp system-id

To display the local system ID used by the Link Aggregation Control Protocol (LACP), enter the **show lacp system-id** command in EXEC mode.

**show lacp system-id**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** EXEC

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | Release 3.2 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



**Note**

The System ID and details about the specific link are transmitted within each LACP packet.

| Task ID | Task ID | Operations |
|---------|---------|------------|
|         | bundle  | read       |

**Examples** The following example shows how to display the system ID used by the LACP:

```
RP/0/RP0/CPU0:router# show lacp system-id
```

```
Priority MAC Address
----- -
0x8000 08-00-45-3a-65-01
```

**Table 77: show lacp system-id Field Descriptions**

| Field       | Description                                                 |
|-------------|-------------------------------------------------------------|
| Priority    | Priority for this system. A lower value is higher priority. |
| MAC Address | MAC address associated with the LACP system ID.             |

**Related Commands**

| Command                                       | Description                                                     |
|-----------------------------------------------|-----------------------------------------------------------------|
| <a href="#">bundle id, on page 752</a>        | Adds a port to an aggregated interface or bundle.               |
| <a href="#">show bundle, on page 777</a>      | Displays information about configured bundles.                  |
| <a href="#">show lacp bundle, on page 793</a> | Displays detailed information about LACP ports and their peers. |
| <a href="#">show lacp port, on page 804</a>   |                                                                 |



# Management Ethernet Interface Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring Management Ethernet interfaces on the Cisco CRS Router.

- [duplex \(Management Ethernet\), page 810](#)
- [interface MgmtEth, page 812](#)
- [mac-address \(Management Ethernet\), page 814](#)
- [speed \(Management Ethernet\), page 816](#)

## duplex (Management Ethernet)

To configure duplex mode operation on a Management Ethernet interface, use the **duplex** command in interface configuration mode. To return the interface to autonegotiated duplex mode, use the **no** form of the **duplex** command.

**duplex** {full| half}

**no duplex**

### Syntax Description

|             |                                                                              |
|-------------|------------------------------------------------------------------------------|
| <b>full</b> | Configures the Management Ethernet interface to operate in full duplex mode. |
| <b>half</b> | Configures the Management Ethernet interface to operate in half duplex mode. |

### Command Default

Autonegotiates duplex operation

### Command Modes

Interface configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

### Examples

The following example shows how to configure the Management Ethernet interface to operate in full duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# duplex full
```

The following example shows how to configure the Management Ethernet interface to operate in half duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# duplex half
```

The following example shows how to return a Management Ethernet interface to autonegotiated duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# no duplex
```

#### Related Commands

| Command                                         | Description                                                                |
|-------------------------------------------------|----------------------------------------------------------------------------|
| <a href="#">interface MgmtEth</a> , on page 812 | Enters interface configuration mode for the Management Ethernet interface. |

# interface MgmtEth

To enter interface configuration mode for the Management Ethernet interface, use the **interface MgmtEth** command in global configuration mode. To delete a Management Ethernet interface configuration, use the **no** form of this command.

**interface MgmtEth** *interface-path-id*

**no interface MgmtEth** *interface-path-id*

## Syntax Description

|                          |                                                                                                            |
|--------------------------|------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.                                                                   |
| <b>Note</b>              | Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router. |
|                          | For more information about the syntax for the router, use the question mark (?) online help function.      |

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to enter interface configuration mode for a Management Ethernet interface:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)#
```



**Related Commands**

| Command                                                        | Description                                                          |
|----------------------------------------------------------------|----------------------------------------------------------------------|
| <a href="#">duplex (Management Ethernet), on page 810</a>      | Configures duplex mode operation on a Management Ethernet interface. |
| <a href="#">mac-address (Management Ethernet), on page 814</a> | Sets the MAC layer address of a Management Ethernet interface.       |
| <a href="#">speed (Management Ethernet), on page 816</a>       | Configures the speed for a Management Ethernet interface.            |

## mac-address (Management Ethernet)

To set the MAC layer address of a Management Ethernet interface, use the **mac-address** command in interface configuration mode. To return the interface to its default MAC address, use the **no** form of the **mac-address** command.

**mac-address** *value1.value2.value3*

**no mac-address**

### Syntax Description

|               |                                                                            |
|---------------|----------------------------------------------------------------------------|
| <i>value1</i> | High 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff.   |
| <i>value2</i> | Middle 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff. |
| <i>value3</i> | Low 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff.    |

### Command Default

The default MAC address is read from the hardware burned-in address (BIA).

### Command Modes

Interface configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The MAC address must be in the form of three 4-digit values (12 digits in dotted decimal notation).

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

### Examples

The following example shows how to set the MAC address of the Management Ethernet interface located at 0/ RP0/CPU0/0:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# mac-address 0001.2468.ABCD
```

**Related Commands**

| Command                                        | Description                                                                |
|------------------------------------------------|----------------------------------------------------------------------------|
| <a href="#">interface MgmtEth, on page 812</a> | Enters interface configuration mode for the Management Ethernet interface. |

## speed (Management Ethernet)

To configure the speed for a Management Ethernet interface, enter the **speed** command in interface configuration mode. To return the system to autonegotiate speed, use the **no** form of the **speed** command.

**speed** {10| 100| 1000}

**no speed**

### Syntax Description

|             |                                                             |
|-------------|-------------------------------------------------------------|
| <b>10</b>   | Configures the interface to transmit at 10 Mbps.            |
| <b>100</b>  | Configures the interface to transmit at 100 Mbps.           |
| <b>1000</b> | Configures the interface to transmit at 1000 Mbps (1 Gbps). |

### Command Default

Interface speed is autonegotiated.

### Command Modes

Interface configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

#### Note

Keep in mind that both ends of a link must have the same interface speed. A manually configured interface speed overrides any autonegotiated speed, which can prevent a link from coming up if the configured interface speed at one end of a link is different from the interface speed on the other end.

[Table 78: Relationship Between duplex and speed Commands, on page 816](#) describes the performance of the system for different combinations of the duplex and speed modes. The specified **duplex** command configured with the specified **speed** command produces the resulting system action.

**Table 78: Relationship Between duplex and speed Commands**

| duplex Command | speed Command | Resulting System Action                     |
|----------------|---------------|---------------------------------------------|
| no duplex      | no speed      | Autonegotiates both speed and duplex modes. |
| no duplex      | speed 1000    | Forces 1000 Mbps (1 Gbps) and full duplex.  |

| duplex Command | speed Command | Resulting System Action                                           |
|----------------|---------------|-------------------------------------------------------------------|
| no duplex      | speed 100     | Autonegotiates for duplex mode and forces 100 Mbps.               |
| no duplex      | speed 10      | Autonegotiates for duplex mode and forces 10 Mbps.                |
| duplex full    | no speed      | Forces full duplex and autonegotiates for speed.                  |
| duplex full    | speed 1000    | Forces 1000 Mbps (1 Gbps) and full duplex.                        |
| duplex full    | speed 100     | Forces 100 Mbps and full duplex.                                  |
| duplex full    | speed 10      | Forces 10 Mbps and full duplex.                                   |
| duplex half    | no speed      | Forces half duplex and autonegotiates for speed (10 or 100 Mbps.) |
| duplex half    | speed 100     | Forces 100 Mbps and half duplex.                                  |
| duplex half    | speed 10      | Forces 10 Mbps and half duplex.                                   |

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

The following example shows how to configure the Management Ethernet interface to transmit at one gigabit:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# speed 1000
```

**Related Commands**

| Command                                        | Description                                                                |
|------------------------------------------------|----------------------------------------------------------------------------|
| <a href="#">interface MgmtEth, on page 812</a> | Enters interface configuration mode for the Management Ethernet interface. |





# Null Interface Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring null interfaces on the Cisco CRS Router.

- [interface null 0, page 820](#)
- [show controllers null interface, page 822](#)
- [show interfaces null0, page 824](#)

# interface null 0

To enter null0 interface configuration mode, use the **interface null 0** command in global configuration mode.

**interface null 0**

## Syntax Description

This command has no keywords or arguments.

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you issue the **interface null 0** command in global configuration mode, the CLI prompt changes to “config-null0,” indicating that you have entered interface configuration mode for the null interface. In the following sample output, the question mark (?) online help function displays all the commands available under the interface configuration mode for the null interface:

```
RP/0/RP0/CPU0:router(config)# interface null 0
RP/0/RP0/CPU0:router(config-null0)#?

 commit Commit the configuration changes to running
 describe Describe a command without taking real actions
 do Run an exec command
 exit Exit from this submode
 no Negate a command or set its defaults
 show Show contents of configuration
```

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to enter null0 interface configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface null 0
```



```
RP/0/RP0/CPU0:router(config-null0)#
```

# show controllers null interface

To display null interface counters, use the **show controllers null interface** command in EXEC mode.

**show controllers null interface**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** EXEC

| Command History | Release     | Modification                       |
|-----------------|-------------|------------------------------------|
|                 | Release 3.0 | This command was first introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID   | Operations |
|---------|-----------|------------|
|         | interface | read       |
|         | sysmgr    | read       |

**Examples** The following is sample output from the **show controllers null interface** command, which displays null interface counters:

```
RP/0/RP0/CPU0:router# show controllers null interface

Null interface:
name : Null10
handle : 0x00080010
rx_count : 0
tx_count : 0
drops : 0
```

**Table 79: show controllers null interface Field Descriptions**

| Field    | Description                                                                                         |
|----------|-----------------------------------------------------------------------------------------------------|
| name     | Interface whose controller information is displayed.                                                |
| handle   | Number that identifies the caps node that hosts the node whose controller information is displayed. |
| rx_count | Total number of packets currently received by the interface.                                        |
| tx_count | Total number of packets currently transmitted by the interface.                                     |
| drops    | Total number of packets dropped by the interface.                                                   |

**Related Commands**

| Command                                             | Description                |
|-----------------------------------------------------|----------------------------|
| <a href="#">show interfaces null0</a> , on page 824 | Displays null0 interfaces. |

# show interfaces null0

To display null0 interfaces, use the **show interfaces null0** command with optional keywords in EXEC mode.

**show interfaces null0** [**accounting rates**| **brief**| **description**| **detail**] [**location** *node-id*]

## Syntax Description

|                                |                                                  |
|--------------------------------|--------------------------------------------------|
| <b>accounting</b>              | Shows interface accounting option.               |
| <b>rates</b>                   | Shows interface accounting (input/output) rates. |
| <b>brief</b>                   | Shows interface information in condensed format. |
| <b>description</b>             | Describes interface.                             |
| <b>detail</b>                  | Shows interface information in detail.           |
| <b>location</b> <i>node-id</i> | Specifies a fully qualified interface location.  |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                                                   |
|---------------|--------------------------------------------------------------------------------|
| Release 3.6.0 | This command variant was added to the existing <b>show interfaces</b> command. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **show interfaces null0** command displays statistics about null interfaces. When no keywords are specified, information for all null interfaces is displayed.

## Task ID

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

## Examples

The following example shows how to use the **show interfaces null0** command:

```
RP/0/RP0/CPU0:router# show interfaces null0

Null0 is up, line protocol is up
 Interface state transitions: 0
 Hardware is Null interface
 Internet address is Unknown
 MTU 1500 bytes, BW Unknown
 reliability 255/255, txload Unknown, rxload Unknown
 Encapsulation Null, loopback not set,
 Last clearing of "show interface" counters never
 5 minute input rate 0 bits/sec, 0 packets/sec
 5 minute output rate 0 bits/sec, 0 packets/sec
 0 packets input, 0 bytes, 0 total input drops
 0 drops for unrecognized upper-level protocol
 Received 0 broadcast packets, 0 multicast packets
 0 packets output, 0 bytes, 0 total output drops
 Output 0 broadcast packets, 0 multicast packets
```

 `show interfaces null0`



## Packet-over-SONET Interface Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring Packet-over-SONET/SDH (POS) on the Cisco CRS Router.

This module describes the Cisco IOS XR commands used to configure, monitor, and troubleshoot Packet-over-SONET/SDH (POS).

POS provides a method for efficiently carrying data packets in SONET or Synchronous Digital Hierarchy (SDH) frames. High-bandwidth capacity and efficient link utilization are characteristics that make POS largely preferred for building the core of data networks. POS uses PPP in High-Level Data Link Control (HDLC)-like framing for data encapsulation at Layer 2 (data link) of the Open System Interconnection (OSI) stack. This method provides efficient packet delineation and error control.

In addition to high-bandwidth efficiency, POS offers secure and reliable transmission for data. Reliable data transfer depends on timing integrity.

The real-time POS functionality is performed in hardware, according to the hardware configuration setup. Configured hardware events are detected by the framer application-specific integrated circuits (ASICs) and the control is passed to the software. The generic POS driver is responsible for providing a mechanism to configure the hardware on a per-interface basis, to handle interface state transitions, and to collect POS-related statistics.

- [crc \(POS\), page 828](#)
- [encapsulation \(POS\), page 830](#)
- [interface pos, page 832](#)
- [keepalive \(POS\), page 834](#)
- [pos, page 836](#)
- [show interfaces pos, page 838](#)
- [transmit-delay, page 841](#)

## crc (POS)

To set the length of the cyclic redundancy check (CRC) on a Packet-over-SONET/SDH (POS) interface, use the **crc** command in POS configuration mode. To return the CRC setting on a POS interface to the 32-bit default setting, use the **no** form of this command.

**crc {16|32}**

**no crc [16|32]**

### Syntax Description

|           |                                               |
|-----------|-----------------------------------------------|
| <b>16</b> | Sets 16-bit CRC mode.                         |
| <b>32</b> | Sets 32-bit CRC mode. The default is 32 bits. |

### Command Default

The default CRC mode is 32 bits.

### Command Modes

POS configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The designators 16 and 32 indicate the length (in bits) of the frame check sequence (FCS). A CRC of 32 bits provides more powerful error detection, but adds overhead. Both the sender and receiver must use the same setting.

CRC-16, the most widely used error checking method throughout the United States and Europe, is used extensively with WANs. CRC-32 is specified by IEEE standard 802 and as an option by some point-to-point transmission standards. It is often used on Switched Multimegabit Data Service (SMDS) networks and LANs.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |



## Examples

In the following example, the 32-bit CRC on POS interface 0/1/0/2 is enabled:

```
rack/slot/module (config) # interface POS 0/1/0/2
rack/slot/module (config-if) # POS
rack/slot/module (config-if-pos) # crc 32
```

## Related Commands

| Command                                      | Description                                                              |
|----------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">transmit-delay</a> , on page 841 | Specifies a number of flag sequences to be inserted between the packets. |

## encapsulation (POS)

To set the Layer 2 encapsulation of an interface, use the **encapsulation** command in interface configuration mode. To restore the system to the default encapsulation, use the **no** form of this command.

**encapsulation** {hdlc| ppp}

**no encapsulation** [hdlc| ppp]

### Syntax Description

|                     |                                                                                                                            |
|---------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>hdlc</b>         | Enables Cisco High-Level Data Link Control (cHDLC) encapsulation on the interface. This is the default encapsulation type. |
| <b>ppp</b>          | Enables Point-to-Point Protocol (PPP) encapsulation on the interface.                                                      |
| <b>frame -relay</b> | Enables Frame Relay encapsuation on the interface.                                                                         |
| <b>ietf</b>         | (Optional) Enables RFC1490/RFC2427 encapsulation.                                                                          |

### Command Default

For Packet-over-SONET/SDH (POS) interfaces, the default encapsulation is HDLC.

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                |
|---------------|-------------------------------------------------------------|
| Release 2.0   | This command was introduced.                                |
| Release 3.4.0 | The <b>frame-relay</b> and <b>ietf</b> keywords were added. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The task ID hdlc (r,w) is required for use of the keyword **hdlc**. The task ID ppp(r,w) is required for use of the keyword **ppp**. The task ID fr(r,w) is required for use of the keyword **frame-relay**.

### Task ID

| Task ID           | Operations  |
|-------------------|-------------|
| hdlc OR ppp OR fr | read, write |
| interface         | read, write |

## Examples

In the following example, PPP encapsulation is set on POS interface 0/3/0/1:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
```

## Related Commands

| Command                                                           | Description                                      |
|-------------------------------------------------------------------|--------------------------------------------------|
| <a href="#">show interfaces pos</a> , <a href="#">on page 838</a> | Displays information about a POS interface.      |
| <a href="#">show ppp interfaces</a> , <a href="#">on page 891</a> | Displays PPP state information for an interface. |

# interface pos

To enter interface or subinterface configuration mode for a POS interface or subinterface, use the **interface pos** command in global configuration mode. To delete a POS configuration, use the **no** form of this command.

**interface pos** *interface-path-id* [.subinterface] [**point-to-point**]

**no interface pos** *interface-path-id* [.subinterface] [**point-to-point**]

## Syntax Description

|                                             |                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i><br>[.subinterface] | Physical interface or virtual interface followed by the optional subinterface path ID. Naming notation is <i>interface-path-id.subinterface</i> . The period in front of the subinterface value is required as part of the notation.<br><br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>point-to-point</b>                       | (Optional) Configures interface to function as one endpoint of a point-to-point link.                                                                                                                                                                                                                                                             |

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

The following example shows how to enter interface configuration mode for a POS interface:

```
RP/0/RP0/CPU0:router(config)# interface pos 0/1/0/0
RP/0/RP0/CPU0:router(config-if)#
```

The following example shows how to create a subinterface on a POS interface in slot 1, subslot 1, port 2 and enter subinterface configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface pos 0/1/1/2.1
RP/0/RP0/CPU0:router(config-subif)#
```

**Related Commands**

| Command                                          | Description                                 |
|--------------------------------------------------|---------------------------------------------|
| <a href="#">show interfaces pos, on page 838</a> | Displays information about a POS interface. |

# keepalive (POS)

To set the keepalive timer for a specific interface, use the **keepalive** command in interface configuration mode. To reset the keepalive timer to the default of 10 seconds, use the **no** form of this command.

**keepalive** {*interval* [*retry*] **disable**}

**no keepalive**

## Syntax Description

|                 |                                                                                                                                                                                                                                                              |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interval</i> | Number of seconds (from 1 to 30) between keepalive messages. The default is 10.                                                                                                                                                                              |
| <i>retry</i>    | (Optional) Number of keepalive messages (from 1 to 255) that can be sent to a peer without a response before transitioning the link to the down state. The default is 5 for interfaces with PPP encapsulation, and 3 for interfaces with HDLC encapsulation. |
| <b>disable</b>  | Turns off the keepalive timer.                                                                                                                                                                                                                               |

## Command Default

The default interval is 10 seconds between keepalive messages. The default number of retry keepalive messages that can be sent without a response is 5 for interfaces with PPP encapsulation, and 3 for interfaces with HDLC encapsulation. However, when more than 5 (or 3) keepalive messages are sent to a peer without a response, the link transitions to the down state.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                         |
|---------------|--------------------------------------|
| Release 2.0   | This command was introduced.         |
| Release 3.9.0 | The <i>retry</i> argument was added. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

cHDLC keepalives require that the **keepalive** command is configured the same way on both routers. The two connected routers have no way of negotiating the keepalive value, because there is no way for the routers to tell each other what their configured values are. The keepalive value configured on each router (local and partner) sets the rate at which the Cisco IOS XR software sends packets. It also sets the rate at which the local end expects to receive incoming packets.

To set the keepalive value to the default value, use the **keepalive** command without specifying a value for the *seconds* argument.

If three keepalives are sent to the peer and no response is received from the peer, then the link makes the transition to the down state.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| hdlc    | read, write |
| ppp     | read,write  |

**Examples**

The following example shows how to configure keepalives for 3 seconds on POS interface 0/7/0/1:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/7/0/1
RP/0/RP0/CPU0:router(config-if)# keepalive 3
```

# pos

To access the POS configuration submode, use the **pos** command in interface configuration mode.

**pos**

## Command Default

No default behavior or values

## Command Modes

Interface configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you issue the **pos** command in interface configuration mode for a POS interface, the CLI prompt changes to “config-if-pos,” indicating that you have entered POS configuration submode. In the following sample output, the question mark (?) online help function displays all the commands available under POS configuration submode:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RP0/CPU0:router(config-if)# POS
RP/0/RP0/CPU0:router(config-if-pos)# ?

 commit Commit the configuration changes to running
 crc Set the CRC on a POS interface
 describe Describe a command without taking real actions
 do Run an exec command
 exit Exit from this submode
 no Negate a command or set its defaults
 show Show contents of configuration
 transmit-delay Set POS transmit delay on an interface
```

## Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

## Examples

The following example shows how to access the POS configuration submode from the POS configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/2
```



```
RP/0/RP0/CPU0:router(config-if)# POS
RP/0/RP0/CPU0:router(config-if-pos)#
```

**Related Commands**

| Command                                     | Description                                                              |
|---------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">crc (POS), on page 828</a>      | Sets the length of the CRC on a Packet-over-SONET/SDH (POS) interface.   |
| <a href="#">transmit-delay, on page 841</a> | Specifies a number of flag sequences to be inserted between the packets. |

# show interfaces pos

To display information about a POS interface, use the **show interfaces pos** command in EXEC mode.

**show interfaces pos** *interface-path-id* [**accounting** [**rates**]] **brief** | **description** | **detail**] [**location** *node-id*]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i>       | (Optional) Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>accounting</b>              | (Optional) Displays accounting information for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.                                                                                                                      |
| <b>rates</b>                   | (Optional) Displays interface accounting rates for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.                                                                                                                  |
| <b>brief</b>                   | (Optional) Displays brief output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.                                                                                                                                |
| <b>description</b>             | Displays descriptive output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.                                                                                                                                     |
| <b>detail</b>                  | (Optional) Displays detailed output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.                                                                                                                             |
| <b>location</b> <i>node-id</i> | (Optional) Displays detailed POS information for the designated node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.                                                                                                                                      |

## Command Default

Enter the **show interfaces pos** command without including any of the optional keywords or arguments to display detailed information about all POS interfaces configured on the router.

## Command Modes

EXEC

## Command History

| Release       | Modification                            |
|---------------|-----------------------------------------|
| Release 2.0   | This command was introduced.            |
| Release 4.0.0 | The <b>summary</b> keyword was removed. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

### Task ID

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

### Examples

The following example shows how to display summarized information for a POS interface on a specific node:

```
RP/0/RP0/CPU0:router# show interfaces pos summary location 0/1/CPU0
```

| Interface Type | Total | UP | Down | Admin Down |
|----------------|-------|----|------|------------|
| ALL TYPES      | 4     | 1  | 1    | 2          |
| IFT_POS        | 4     | 1  | 1    | 2          |

**Table 80: show interfaces pos summary Field Descriptions**

| Field     | Description                                                              |
|-----------|--------------------------------------------------------------------------|
| Intf Type | Type of interface described in the display.                              |
| Total     | Total number of configured interfaces of the specified type.             |
| Up        | Number of interfaces of the specified type that are in the “Up” state.   |
| Down      | Number of interfaces of the specified type that are in the “Down” state. |

| Field      | Description                                                                    |
|------------|--------------------------------------------------------------------------------|
| Admin Down | Number of interfaces of the specified type that are in the “Admin Down” state. |

The following example shows how to display brief information for a specific POS interface:

```
RP/0/RP0/CPU0:router# show interfaces pos 0/2/0/0 brief
```

| Intf<br>Name | Intf<br>State | LineP<br>State | Encap<br>Type | MTU<br>(byte) | BW<br>(Kbps) |
|--------------|---------------|----------------|---------------|---------------|--------------|
| PO0/2/0/0    | admin-down    | admin-down     | HDLC          | 4474          | 2488320      |

**Table 81: show interfaces pos Field Descriptions**

| Field       | Description                                                                             |
|-------------|-----------------------------------------------------------------------------------------|
| Intf Name   | Interface identifier, in the <i>type*rack/slot/module/port</i> notation.                |
| Intf State  | Indicates whether the interface is in the admin-up or admin down state.                 |
| LineP State | Line protocol state.                                                                    |
| Encap Type  | Encapsulation type for the specified interface. Can be HDLC or PPP.                     |
| MTU (byte)  | Maximum transmission unit (MTU) value configured for the specified interface, in bytes. |
| BW (Kbps)   | Bandwidth of the interface, in kbps.                                                    |

## Related Commands

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers pos, on page 977</a>   | Displays information on the POS controllers.                       |
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers. |

# transmit-delay

To specify a number of flag sequences to be inserted between the packets, use the **transmit-delay** command in POS configuration mode. To restore the default, use the **no** form of this command.

**transmit-delay** *microseconds*

**no transmit-delay** *microseconds*

## Syntax Description

|                     |                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------|
| <i>microseconds</i> | Number of microseconds of minimum delay after sending a packet. Range is from 0 to 1023. Default is 0 (disabled). |
|---------------------|-------------------------------------------------------------------------------------------------------------------|

## Command Default

*microseconds* = 0 (disabled)

## Command Modes

POS configuration

## Command History

| Releases    | Modifications                |
|-------------|------------------------------|
| Release 3.2 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

## Examples

In the following example, a delay of 2 microseconds is specified on POS interface 0/1/0/2:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RP0/CPU0:router(config-if)# pos
RP/0/RP0/CPU0:router(config-if-pos)# transmit-delay 2
```

In the following example, the transmit delay on POS interface 0/1/0/2 is disabled:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RP0/CPU0:router(config-if)# pos
```

```
RP/0/RP0/CPU0:router(config-if-pos)# no transmit-delay
```

**Related Commands**

| Command         | Description |
|-----------------|-------------|
| show interfaces |             |



## PPP Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring Point-to-Point Protocol (PPP) on the Cisco CRS Router.

Point-to-Point Protocol (PPP) is an encapsulation scheme that can be used on Packet-over-SONET (POS) and serial interfaces. PPP is a standard protocol used to send data over synchronous serial links. PPP also provides a Link Control Protocol (LCP) for negotiating properties of the link. LCP uses echo requests and responses to monitor the continuing availability of the link.

PPP provides the following Network Control Protocols (NCPs) for negotiating properties of data protocols that will run on the link:

- Cisco Discovery Protocol Control Protocol (CDPCP) to negotiate CDP properties
  - IP Control Protocol (IPCP) to negotiate IP properties
  - IP Version 6 Control Protocol (IPv6CP) to negotiate IPv6 properties
  - Multiprotocol Label Switching Control Protocol (MPLSCP) to negotiate MPLS properties
  - Open System Interconnection Control Protocol (OSICP) to negotiate OSI properties
- 
- [clear ppp sso state, page 845](#)
  - [clear ppp statistics, page 847](#)
  - [encapsulation ppp, page 848](#)
  - [group, page 850](#)
  - [multi-router aps, page 852](#)
  - [peer ipv4 address, page 853](#)
  - [ppp authentication, page 854](#)
  - [ppp chap password, page 857](#)
  - [ppp chap refuse, page 859](#)
  - [ppp ipcp dns, page 861](#)
  - [ppp ipcp neighbor-route disable, page 862](#)
  - [ppp ipcp peer-address default, page 863](#)

- [ppp max-bad-auth, page 864](#)
- [ppp max-configure, page 866](#)
- [ppp max-failure, page 868](#)
- [ppp max-terminate, page 870](#)
- [ppp ms-chap hostname, page 872](#)
- [ppp ms-chap password, page 873](#)
- [ppp ms-chap refuse, page 875](#)
- [ppp multilink multiclass, page 877](#)
- [ppp multilink multiclass local, page 878](#)
- [ppp multilink multiclass remote apply, page 880](#)
- [ppp pap refuse, page 882](#)
- [ppp pap sent-username password, page 884](#)
- [ppp timeout authentication, page 886](#)
- [ppp timeout retry, page 888](#)
- [redundancy, page 889](#)
- [security ttl, page 890](#)
- [show ppp interfaces, page 891](#)
- [show ppp sso alerts, page 899](#)
- [show ppp sso state, page 901](#)
- [show ppp sso summary, page 903](#)
- [ssrp group, page 905](#)
- [ssrp location, page 907](#)
- [ssrp profile, page 908](#)



# clear ppp sso state

To clear the replicated Inter-Chassis Stateful Switchover (ICSSO) states for the specified standby interface or for all interfaces on the specified node, use the **clear ppp sso state** command in EXEC mode.

**clear ppp sso state** {**interface** *interface-path-id* | **all**} **location** *node-id*

## Syntax Description

|                                           |                                                                                                                                                                                                                                                                                 |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface</b> <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>all location</b> <i>node-id</i>        | Specifies the full qualified path of a specific node in the format <i>rack/slot/module</i> .                                                                                                                                                                                    |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command sets the PPP sessions in the Standby-Up state to the Standby-Down state. All replicated data received from the peer is purged, and SSRP Request messages are re-sent to the peer.

## Task ID

| Task ID | Operations |
|---------|------------|
| ppp     | execute    |

## Examples

The following example shows how to clear the replicated ICSSO states for the specified standby interface:

```
RP/0/RP0/CPU0:router# clear ppp sso state interface 0/1/0/1
```

The following example shows how to clear the replicated Inter-Chassis Stateful Switchover (ICSSO) states for all interfaces on the specified node:

```
RP/0/RP0/CPU0:router# clear ppp sso state all location 1/0/1
```

# clear ppp statistics

To clear all Point-to-Point Protocol (PPP) statistics for a PPP interface, use the **clear ppp statistics** command in EXEC mode.

**clear ppp statistics interface** *interface-path-id*

## Syntax Description

**interface** *interface-path-id* Physical interface or virtual interface.

**Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router.

For more information about the syntax for the router, use the question mark (?) online help function.

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations |
|---------|------------|
| ppp     | execute    |

## Examples

The following example shows how to clear PPP statistics for a PPP interface:

```
RP/0/RP0/CPU0:router# clear ppp statistics interface 0/1/0/1
```

# encapsulation ppp

To enable encapsulation for communication with routers or bridges using the Point-to-Point Protocol (PPP), use the **encapsulation ppp** command in interface configuration mode. To disable PPP encapsulation, use the **no** form of this command.

**encapsulation ppp**  
**no encapsulation ppp**

| Syntax Description | This command has no keywords or arguments.                                                                                           |         |              |             |                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|-------------|------------------------------|
| Command Default    | PPP encapsulation is disabled.                                                                                                       |         |              |             |                              |
| Command Modes      | Interface configuration                                                                                                              |         |              |             |                              |
| Command History    | <table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>Release 2.0</td><td>This command was introduced.</td></tr> </table> | Release | Modification | Release 2.0 | This command was introduced. |
| Release            | Modification                                                                                                                         |         |              |             |                              |
| Release 2.0        | This command was introduced.                                                                                                         |         |              |             |                              |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **encapsulation ppp** command to enable PPP encapsulation on an interface.

| Task ID   | <table> <tr> <th>Task ID</th><th>Operations</th></tr> <tr> <td>ppp</td><td>read, write</td></tr> <tr> <td>interface</td><td>read, write</td></tr> </table> | Task ID | Operations | ppp | read, write | interface | read, write |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|-----|-------------|-----------|-------------|
| Task ID   | Operations                                                                                                                                                 |         |            |     |             |           |             |
| ppp       | read, write                                                                                                                                                |         |            |     |             |           |             |
| interface | read, write                                                                                                                                                |         |            |     |             |           |             |

**Examples**

The following example shows how to set up PPP encapsulation on interface POS 0/1/0/1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router# interface serial 0/0/1/2/4:3
RP/0/RP0/CPU0:router# encapsulation ppp
```

**Related Commands**

| Command                                           | Description                                      |
|---------------------------------------------------|--------------------------------------------------|
| <a href="#">show ppp interfaces</a> , on page 891 | Displays PPP state information for an interface. |

# group

To create a Session State Redundancy Protocol (SSRP) group and associate it with a profile, use the **group** command in global configuration mode. To remove this group, use the no form of this command.

```
group group-id profile profile_name [default]
no group group-id profile profile_name [default]
```

## Syntax Description

|                                    |                                                 |
|------------------------------------|-------------------------------------------------|
| <i>group-id</i>                    | SSRP group identifier. The range is 1 to 65535. |
| <b>profile</b> <i>profile_name</i> | Profile to associate with this group.           |
| <b>default</b>                     | Associates the group to the default profile.    |

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Any interfaces on this card can be configured to use this group. The group number must be unique across the router.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

## Examples

The following example shows how to create an SSRP group:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ssrp location 0/1/cpu0
RP/0/RP0/CPU0:router(config-ssrp-node)# group 1 profile default
```

**Related Commands**

| Command                                     | Description                                                                                  |
|---------------------------------------------|----------------------------------------------------------------------------------------------|
| <a href="#">ssrp location</a> , on page 907 | specify the node on which to create a SSRP group and enter the SSRP node configuration mode. |

# multi-router aps

To configure Multi-Router Automatic Protection Switching (MR-APS) and enter APS redundancy configuration mode, use the **multi-router aps** command in redundancy configuration mode. To deactivate Multi-Router Automatic Protection Switching (MR-APS), use the no form of this command.

**multi-router aps**  
**no multi-router aps**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** Redundancy configuration

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.9.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID | Operations |
|---------|---------|------------|
|         | ppp     | read       |

**Examples** The following example shows how to

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# redundancy
RP/0/RP0/CPU0:router(config-redundancy)# multi-router aps
RP/0/RP0/CPU0:router(config-redundancy-aps)
```

| Related Commands | Command                                                  | Description                                                   |
|------------------|----------------------------------------------------------|---------------------------------------------------------------|
|                  | <a href="#">redundancy</a> , <a href="#">on page 889</a> | Enters the redundancy configuration mode to configure MR-APS. |



# peer ipv4 address

To configure the IPv4 address for a Session State Redundancy Protocol (SSRP) peer, use the **peer ipv4 address** command in SSRP configuration mode. To remove the address, use the no form of this command.

**peer ipv4 address** *ip-address*

**no peer ipv4 address** *ip-address*

| Syntax Description                        | <div><div><i>ip-address</i></div><div>IP address of the peer interface whose states will be replicated by SSRP.</div></div>                                                                                                                                                                                  |  |         |              |                                           |                                                                   |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|-------------------------------------------|-------------------------------------------------------------------|
| Command Default                           | No default behavior or values                                                                                                                                                                                                                                                                                |  |         |              |                                           |                                                                   |
| Command Modes                             | SSRP configuration                                                                                                                                                                                                                                                                                           |  |         |              |                                           |                                                                   |
| Command History                           | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>Release 3.9.0</td><td>This command was introduced.</td></tr></table>                                                                                                                                                                            |  | Release | Modification | Release 3.9.0                             | This command was introduced.                                      |
| Release                                   | Modification                                                                                                                                                                                                                                                                                                 |  |         |              |                                           |                                                                   |
| Release 3.9.0                             | This command was introduced.                                                                                                                                                                                                                                                                                 |  |         |              |                                           |                                                                   |
| Usage Guidelines                          | To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.                                                                        |  |         |              |                                           |                                                                   |
| Task ID                                   | <table><tr><th>Task ID</th><th>Operations</th></tr><tr><td>ppp</td><td>read, write</td></tr></table>                                                                                                                                                                                                         |  | Task ID | Operations   | ppp                                       | read, write                                                       |
| Task ID                                   | Operations                                                                                                                                                                                                                                                                                                   |  |         |              |                                           |                                                                   |
| ppp                                       | read, write                                                                                                                                                                                                                                                                                                  |  |         |              |                                           |                                                                   |
| Examples                                  | <p>The following example shows how to configure the IPv4 address for a Session State Redundancy Protocol (SSRP) peer:</p> <pre>RP/0/RP0/CPU0:router# <b>config</b> RP/0/RP0/CPU0:router(config)# <b>ssrp profile Profile_1</b> RP/0/RP0/CPU0:router(config-ssrp)# <b>peer ipv4 address 10.10.10.10</b></pre> |  |         |              |                                           |                                                                   |
| Related Commands                          | <table><tr><th>Command</th><th>Description</th></tr><tr><td><a href="#">ssrp profile, on page 908</a></td><td>Configures a SSRP profile and enters the SSRP configuration mode.</td></tr></table>                                                                                                            |  | Command | Description  | <a href="#">ssrp profile, on page 908</a> | Configures a SSRP profile and enters the SSRP configuration mode. |
| Command                                   | Description                                                                                                                                                                                                                                                                                                  |  |         |              |                                           |                                                                   |
| <a href="#">ssrp profile, on page 908</a> | Configures a SSRP profile and enters the SSRP configuration mode.                                                                                                                                                                                                                                            |  |         |              |                                           |                                                                   |

# ppp authentication

To enable Challenge Handshake Authentication Protocol (CHAP), MS-CHAP, or Password Authentication Protocol (PAP), and to specify the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface, use the **ppp authentication** command in interface configuration mode. To disable PPP authentication, use the **no** form of this command.

```
ppp authentication protocol [protocol [protocol]] {list-name| default}
no ppp authentication
```

### Syntax Description

|                  |                                                                                                                                                                                                                                                              |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>protocol</i>  | Name of the authentication protocol used for PPP authentication. See <a href="#">Table 82: PPP Authentication Protocols for Negotiation, on page 855</a> for the appropriate keyword. You may select one, two, or all three protocols, in any order.         |
| <i>list-name</i> | (Optional) Used with authentication, authorization, and accounting (AAA). Name of a list of methods of authentication to use. If no list name is specified, the system uses the default. The list is created with the <b>aaa authentication ppp</b> command. |
| <b>default</b>   | (Optional) Specifies the name of the list of methods created with the <b>aaa authentication ppp</b> command.                                                                                                                                                 |

### Command Default

PPP authentication is not enabled.

### Command Modes

Interface configuration

### Command History

| Release     | Modification                                                                                        |
|-------------|-----------------------------------------------------------------------------------------------------|
| Release 2.0 | This command was introduced.                                                                        |
| Release 3.2 | This command was corrected to include the possibility of specifying three protocols simultaneously. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When you enable CHAP or PAP authentication (or both), the local router requires the remote device to prove its identity before allowing data traffic to flow. PAP authentication requires the remote device to send a name and a password, which is checked against a matching entry in the local username database or in the remote security server database. CHAP authentication sends a challenge message to the remote device. The remote device encrypts the challenge value with a shared secret and returns the encrypted value and its name to the

local router in a response message. The local router attempts to match the remote device's name with an associated secret stored in the local username or remote security server database; it uses the stored secret to encrypt the original challenge and verify that the encrypted values match.

You can enable CHAP, MS-CHAP, or PAP in any order. If you enable all three methods, the first method specified is requested during link negotiation. If the peer suggests using the second method, or refuses the first method, the second method is tried. Some remote devices support only one method. Base the order in which you specify methods on the remote device's ability to correctly negotiate the appropriate method, and on the level of data line security you require. PAP usernames and passwords are sent as clear text strings, which can be intercepted and reused.

**Note**

If you use a *list-name* value that was not configured with the **aaa authentication ppp** command, then authentication does not complete successfully and the line does not come up.

[Table 82: PPP Authentication Protocols for Negotiation, on page 855](#) lists the protocols used to negotiate PPP authentication.

**Table 82: PPP Authentication Protocols for Negotiation**

| Protocol | Description                                                    |
|----------|----------------------------------------------------------------|
| chap     | Enables CHAP on an interface.                                  |
| ms-chap  | Enables Microsoft's version of CHAP (MS-CHAP) on an interface. |
| pap      | Enables PAP on an interface.                                   |

Enabling or disabling PPP authentication does not affect the ability of the local router to authenticate itself to the remote device.

MS-CHAP is the Microsoft version of CHAP. Like the standard version of CHAP, MS-CHAP is used for PPP authentication. In this case, authentication occurs between a personal computer using Microsoft Windows NT or Microsoft Windows 95 and a Cisco router or access server acting as a network access server.

Enabling or disabling PPP authentication does not affect the local router authenticating itself to the remote device.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |
| aaa     | read, write |

**Examples**

In the following example, CHAP is enabled on POS 0/4/0/1 and uses the authentication list MIS-access:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/4/0/1
```

```
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp authentication chap MIS-access
```

Related Commands

| Command                | Description                                                                                         |
|------------------------|-----------------------------------------------------------------------------------------------------|
| aaa authentication ppp | Specifies one or more AAA authentication methods for use on serial interfaces running PPP.          |
| encapsulation          | Sets the encapsulation method used by the interface.                                                |
| username               | Configures a new user with a username, establishes a password, and grants permissions for the user. |

## ppp chap password

To enable a router calling a collection of routers to configure a common Challenge Handshake Authentication Protocol (CHAP) secret password, use the **ppp chap password** command in interface configuration mode. To disable the password, use the **no** form of this command.

**ppp chap password** [**clear**| **encrypted**] *password*

**no ppp chap password** [**clear**| **encrypted**] *password*

### Syntax Description

|                  |                                                                           |
|------------------|---------------------------------------------------------------------------|
| <b>clear</b>     | (Optional) Specifies the cleartext encryption parameter for the password. |
| <b>encrypted</b> | (Optional) Indicates that the password is already encrypted.              |
| <i>password</i>  | Cleartext or already-encrypted password.                                  |

### Command Default

The password is disabled.

### Command Modes

Interface configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **ppp chap password** command is sent in CHAP responses and is used by the peer to authenticate the local router. This does not affect local authentication of the peer. This command is useful for routers that do not support this command (such as routers running older Cisco IOS XR images).

The CHAP secret password is used by the routers in response to challenges from an unknown peer.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |
| aaa     | read, write |

Examples

In the following example, a password (xxxx) is entered as a cleartext password:

```
RP/0/RP0/CPU0:router(config-if)# ppp chap password xxxx
```

When the password is displayed (as shown in the following example, using the **show running-config** command), the password xxxx appears as 030752180500:

```
RP/0/RP0/CPU0:router(config)# show running-config interface POS 1/0/1/0

interface POS0/1/4/2

description Connected to P1_CRS-8 POS 0/1/4/3
ipv4 address 10.12.32.2 255.255.255.0
encapsulation ppp
ppp authentication chap pap
ppp chap password encrypted 030752180500
```

On subsequent logins, entering any of the three following commands would have the same effect of making xxxx the password for remote CHAP authentication:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 1/0/1/0
RP/0/RP0/CPU0:router(config-if)# ppp chap password xxxx
RP/0/RP0/CPU0:router(config-if)# ppp chap password clear xxxx
RP/0/RP0/CPU0:router(config-if)# ppp chap password encrypted 1514190900
```

Related Commands

| Command                                         | Description                                                                                                                                                   |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>aaa authentication ppp</b>                   | Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.                                   |
| <a href="#">ppp authentication, on page 854</a> | Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.                           |
| <a href="#">ppp chap refuse, on page 859</a>    | Refuses CHAP authentication from peers requesting it.                                                                                                         |
| <a href="#">ppp max-bad-auth, on page 864</a>   | Configures a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries. |
| <b>show running-config</b>                      | Displays the contents of the currently running configuration file or the configuration for a specific interface, or map class information.                    |

# ppp chap refuse

To refuse Challenge Handshake Authentication Protocol (CHAP) authentication from peers requesting it, use the **ppp chap refuse** command in interface configuration mode. To allow CHAP authentication, use the **no** form of this command.

**ppp chap refuse**

**no ppp chap refuse**

**Syntax Description** This command has no keywords or arguments.

**Command Default** CHAP authentication is disabled.

**Command Modes** Interface configuration

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **ppp chap refuse** command specifies that CHAP authentication is disabled for all calls, meaning that all attempts by the peer to force the user to authenticate using CHAP are refused.

If outbound Password Authentication Protocol (PAP) has been configured (using the **ppp authentication** command), PAP is suggested as the authentication method in the refusal packet.

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |
| aaa     | read, write |

**Examples** The following example shows how to specify POS interface 0/3/0/1 and disable CHAP authentication from occurring if a peer calls in requesting CHAP authentication. The method of encapsulation on the interface is PPP.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
```

```
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp chap refuse
```

Related Commands

| Command                                                     | Description                                                                                                                                                           |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>aaa authentication ppp</b>                               | Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.                                           |
| <a href="#">ppp authentication, on page 854</a>             | Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.                                   |
| <a href="#">ppp max-bad-auth, on page 864</a>               | Configures a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries.         |
| <a href="#">ppp pap sent-username password, on page 884</a> | Enables remote PAP support for an interface, and includes the <b>sent-username</b> and <b>password</b> commands in the PAP authentication request packet to the peer. |



## ppp ipcp dns

To configure the primary and secondary Domain Name System (DNS) IP addresses for the Internet Protocol Control Protocol (IPCP), use the **ppp ipcp dns** command in interface configuration mode. To remove the addresses, use the no form of this command.

**ppp ipcp dns** *primary-ip-address* [ *sec-ip-address* ]

**no ppp ipcp dns** *primary-ip-address* [ *sec-ip-address* ]

### Syntax Description

|                           |                                                  |
|---------------------------|--------------------------------------------------|
| <i>primary-ip-address</i> | Primary DNS IP address, in the format A.B.C.D.   |
| <i>sec-ip-address</i>     | Secondary DNS IP address, in the format W.X.Y.Z. |

### Command Default

No default behavior or values

### Command Modes

Interface configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

### Examples

The following example shows how to configure the primary and secondary DNS IP addresses for Internet Protocol Control Protocol (IPCP):

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ppp ipcp dns 10.10.10.10 10.10.10.11
```

# ppp ipcp neighbor-route disable

To disable installation of a route to the peer address negotiated by Internet Protocol Control Protocol (IPCP), use the **ppp ipcp neighbor-route disable** command in interface configuration mode. To re-enable installation of a route to the peer address negotiated by IPCP, use the no form of this command.

```
ppp ipcp neighbor-route disable
no ppp ipcp neighbor-route disable
```

| Syntax Description | This command has no keywords or arguments. |                              |
|--------------------|--------------------------------------------|------------------------------|
| Command Default    | No default behavior or values              |                              |
| Command Modes      | Interface configuration                    |                              |
| Command History    | Release                                    | Modification                 |
|                    | Release 3.9.0                              | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | ppp     | read, write |

**Examples**

The following example shows how to disable installation of a route to the peer address negotiated by IPCP:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ppp ipcp neighbor-route disable
```

## ppp ipcp peer-address default

To specify the default IPv4 address that is assigned to the peer by the Internet Protocol Control Protocol (IPCP), use the **ppp ipcp peer-address default** command in interface configuration mode. To remove the address, use the no form of this command.

**ppp ipcp peer-address default** *ip-address*

**no ppp ipcp peer-address default** *ip-address*

### Syntax Description

|                   |                                             |
|-------------------|---------------------------------------------|
| <i>ip-address</i> | Specifies the IP address for the peer node. |
|-------------------|---------------------------------------------|

### Command Default

No default behavior or values

### Command Modes

Interface configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

### Examples

The following example shows how to specifies the default IPv4 address that is assigned to the peer by IPCP.

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ppp ipcp peer-address default 10.10.10.10
```

# ppp max-bad-auth

To configure a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries, use the **ppp max-bad-auth** command in the appropriate configuration mode. To reset to the default of immediate reset, use the **no** form of this command.

```
ppp max-bad-auth retries
no ppp max-bad-auth
```

|                    |         |                                                                                                              |
|--------------------|---------|--------------------------------------------------------------------------------------------------------------|
| Syntax Description | retries | Number of retries after which the interface is to reset itself. Range is from 0 to 10. Default is 0 retries. |
|--------------------|---------|--------------------------------------------------------------------------------------------------------------|

|                 |            |
|-----------------|------------|
| Command Default | retries: 0 |
|-----------------|------------|

|               |                                                           |
|---------------|-----------------------------------------------------------|
| Command Modes | Interface configuration<br>Dynamic template configuration |
|---------------|-----------------------------------------------------------|

|                 |             |                              |
|-----------------|-------------|------------------------------|
| Command History | Release     | Modification                 |
|                 | Release 2.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **ppp max-bad-auth** command applies to any interface on which PPP encapsulation is enabled.

Use the **dynamic-template** command to enter the dynamic template configuration mode.

|         |         |             |
|---------|---------|-------------|
| Task ID | Task ID | Operations  |
|         | ppp     | read, write |
|         | aaa     | read, write |

## Examples

In this example, POS interface 0/3/0/1 is set to allow two additional retries after an initial authentication failure (for a total of three failed authentication attempts):

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp authentication chap
RP/0/RP0/CPU0:router(config-if)# ppp max-bad-auth 3
```

This example shows how to allow two additional retries after an initial authentication failure in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ppp max-configure 5
```

# ppp max-configure

To specify the maximum number of configure requests to attempt (without response) before stopping the requests, use the **ppp max-configure** command in interface configuration mode. To disable the maximum number of configure requests and return to the default, use the **no** form of this command.

```
ppp max-configure retries
no ppp max-configure
```

|                    |         |                                                                  |
|--------------------|---------|------------------------------------------------------------------|
| Syntax Description | retries | Maximum number of retries. Range is 4 through 20. Default is 10. |
|--------------------|---------|------------------------------------------------------------------|

|                 |             |
|-----------------|-------------|
| Command Default | retries: 10 |
|-----------------|-------------|

|               |                                                           |
|---------------|-----------------------------------------------------------|
| Command Modes | Interface configuration<br>Dynamic template configuration |
|---------------|-----------------------------------------------------------|

|                 |             |                              |
|-----------------|-------------|------------------------------|
| Command History | Release     | Modification                 |
|                 | Release 2.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ppp max-configure** command to specify how many times an attempt is made to establish a Link Control Protocol (LCP) session between two peers for a particular interface. If a configure request message receives a reply before the maximum number of configure requests are sent, further configure requests are abandoned.

Use the **dynamic-template** command to enter the dynamic template configuration mode.

|         |         |             |
|---------|---------|-------------|
| Task ID | Task ID | Operations  |
|         | ppp     | read, write |
|         | aaa     | read, write |

## Examples

This example shows a limit of four configure requests:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp max-configure 4
```

This example shows how a limit of four configure requests is specified in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ppp ipcp
```

## Related Commands

| Command                                                       | Description                                                                                       |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <a href="#">ppp max-failure</a> , <a href="#">on page 868</a> | Configures the maximum number of consecutive CONFNAKs to permit before terminating a negotiation. |

# ppp max-failure

To configure the maximum number of consecutive Configure Negative Acknowledgments (CONFNAKs) to permit before terminating a negotiation, use the **ppp max-failure** command in the appropriate configuration mode. To disable the maximum number of CONFNAKs and return to the default, use the **no** form of this command.

```
ppp max-failure retries
no ppp max-failure
```

## Syntax Description

|                |                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------|
| <i>retries</i> | Maximum number of CONFNAKs to permit before terminating a negotiation. Range is from 2 to 10. Default is 5. |
|----------------|-------------------------------------------------------------------------------------------------------------|

## Command Default

*retries: 5*

## Command Modes

Interface configuration  
Dynamic template configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **dynamic-template** command to enter the dynamic template configuration mode.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |
| aaa     | read, write |

## Examples

The **ppp max-failure** command specifies that no more than three CONFNAKs are permitted before terminating the negotiation:

```
RP/0/RP0/CPU0:router# configure
```



```
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp max-failure 3
```

This example shows how no more than three CONFNAKs are permitted before terminating the negotiation in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ppp max-failure 4i
```

#### Related Commands

| Command                                                         | Description                                                                                                    |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <a href="#">ppp max-configure</a> , <a href="#">on page 866</a> | Specifies the maximum number of configure requests to attempt (without response) before stopping the requests. |

# ppp max-terminate

To configure the maximum number of terminate requests (TermReqs) to send without reply before closing down the Link Control Protocol (LCP) or Network Control Protocol (NCP), use the **ppp max-terminate** command in interface configuration mode. To disable the maximum number of TermReqs and return to the default, use the **no** form of this command.

```
ppp max-terminate number
no ppp max-terminate
```

|                    |                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <div> <div>number</div> <div>Maximum number of TermReqs to send without reply before closing down the LCP or NCP. Range is from 2 to 10. Default is 2.</div> </div> |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |           |
|-----------------|-----------|
| Command Default | number: 2 |
|-----------------|-----------|

|               |                         |
|---------------|-------------------------|
| Command Modes | Interface configuration |
|---------------|-------------------------|

|                 |                                                                             |
|-----------------|-----------------------------------------------------------------------------|
| Command History | <div> <div>Release</div> <div>Modification</div> </div>                     |
|                 | <div> <div>Release 2.0</div> <div>This command was introduced.</div> </div> |

|                  |                                                                                                                                                                                                                                       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Guidelines | To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance. |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|         |                                                       |
|---------|-------------------------------------------------------|
| Task ID | <div> <div>Task ID</div> <div>Operations</div> </div> |
|         | <div> <div>ppp</div> <div>read, write</div> </div>    |

Examples

In the following example, a maximum of five TermReqs are specified to be sent before terminating and closing LCP or NCP:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp max-terminate 5
```

**Related Commands**

| Command                                        | Description                                                                                                    |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <a href="#">ppp max-configure, on page 866</a> | Specifies the maximum number of configure requests to attempt (without response) before stopping the requests. |
| <a href="#">ppp max-failure, on page 868</a>   | Configures the maximum number of consecutive CONFNAKs to permit before terminating a negotiation.              |

# ppp ms-chap hostname

To configure the hostname for MS-CHAP authentication on an interface, use the **ppp ms-chap hostname** command in interface configuration mode. To remove the hostname, use the no form of this command.

```
ppp ms-chap hostname hostname
no ppp ms-chap hostname hostname
```

|                    |                                                                    |
|--------------------|--------------------------------------------------------------------|
| Syntax Description | <i>hostname</i> Specifies the hostname for MS-CHAP authentication. |
|--------------------|--------------------------------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| Command Default | No default behavior or values |
|-----------------|-------------------------------|

|               |                         |
|---------------|-------------------------|
| Command Modes | Interface configuration |
|---------------|-------------------------|

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.9.0 | This command was introduced. |

|                  |                                                                                                                                                                                                                                       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Guidelines | To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance. |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | ppp     | read, write |
|         | aaa     | read, write |

|          |                                                                                                       |
|----------|-------------------------------------------------------------------------------------------------------|
| Examples | The following example shows how to configure the hostname for MS-CHAP authentication on an interface: |
|----------|-------------------------------------------------------------------------------------------------------|

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ppp ms-chap hostname Host_1
```

# ppp ms-chap password

To configure a common Microsoft Challenge Handshake Authentication (MS-CHAP) secret password, use the **ppp ms-chap password** command in interface configuration mode. To disable the password, use the **no** form of this command.

**ppp ms-chap password** [**clear**| **encrypted**] *password*

**no ppp ms-chap password** [**clear**| **encrypted**] *password*

## Syntax Description

|                  |                                                                           |
|------------------|---------------------------------------------------------------------------|
| <b>clear</b>     | (Optional) Specifies the cleartext encryption parameter for the password. |
| <b>encrypted</b> | (Optional) Indicates that the password is already encrypted.              |
| <i>password</i>  | Cleartext or already-encrypted password.                                  |

## Command Default

The password is disabled.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.3.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **ppp ms-chap password** command is sent in CHAP responses and is used by the peer to authenticate the local router. This does not affect local authentication of the peer. The **ppp ms-chap password** command is useful for routers that do not support this command (such as routers running older software images).

The MS-CHAP secret password is used by the routers in response to challenges from an unknown peer.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

## Examples

The following example shows how to enter a password (xxxx) as a cleartext password:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp ms-chap password clear xxxx
```

## ppp ms-chap refuse

To refuse Microsoft Challenge Handshake Authentication Protocol (MS-CHAP) authentication from peers requesting it, use the **ppp ms-chap refuse** command in interface configuration mode. To allow MS-CHAP authentication, use the **no** form of this command.

**ppp ms-chap refuse**

**no ppp ms-chap refuse**

**Syntax Description** This command has no keywords or arguments.

**Command Default** MS-CHAP authentication is disabled.

**Command Modes** Interface configuration

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.3.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **ppp ms-chap refuse** command specifies that MS-CHAP authentication is disabled for all calls, meaning that all attempts by the peer to force the user to authenticate using MS-CHAP are refused.

If outbound Password Authentication Protocol (PAP) has been configured (using the **ppp authentication** command), PAP is suggested as the authentication method in the refusal packet.

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | ppp     | read, write |

**Examples** The following example shows how to specify POS interface 0/3/0/1 and disable MS-CHAP authentication from occurring if a peer calls in requesting MS-CHAP authentication. The method of encapsulation on the interface is PPP.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp ms-chap refuse
```

Related Commands

| Command                                                          | Description                                                                                                                         |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">ppp authentication</a> , <a href="#">on page 854</a> | Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface. |



# ppp multilink multiclass

To enable multiclass multilink PPP, use the **ppp multilink multiclass** command in interface configuration mode. To disable multiclass multilink PPP, use the no form of this command.

**ppp multilink multiclass**

**no ppp multilink multiclass**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** Interface configuration

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

**Examples** The following example shows how to enable multiclass multilink PPP:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RP0/CPU0:router(config-if)# ppp multilink multiclass
```

# ppp multilink multiclass local

To configure the initial number and maximum number of Multiclass Multilink PPP (MCMP) receive classes in a Conf-Request sent from a local host to its peer, use the **ppp multilink multiclass local** command in interface configuration mode. To remove these settings, use the no form of this command.

```
ppp multilink multiclass local initial init-number maximum max-number
no ppp multilink multiclass local initial init-number maximum max-number
```

|                    |                                   |                                                                                            |
|--------------------|-----------------------------------|--------------------------------------------------------------------------------------------|
| Syntax Description | <b>initial</b> <i>init-number</i> | Specifies the initial number of receive classes in the Conf-Request. The range is 1 to 16. |
|                    | <b>maximum</b> <i>max-number</i>  | Specifies the maximum number of receive classes in the Conf-Request. The range is 1 to 16. |

**Command Default** When MCMP is enabled, the default **initial** value is 2 and the default **maximum** value is 4.

**Command Modes** Interface configuration

|                 |                |                              |
|-----------------|----------------|------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>          |
|                 | Release 3.9.0  | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The maximum number of receive classes configures the number of transmission classes on the local host.

|         |                |                   |
|---------|----------------|-------------------|
| Task ID | <b>Task ID</b> | <b>Operations</b> |
|         | ppp            | read, write       |

**Examples**

The following example shows how to configure the initial number and maximum number of Multiclass Multilink PPP (MCMP) receive classes in a Conf-Request sent from a local host to its peer:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
```

```
RP/0/RP0/CPU0:router(config-if)# ppp multilink multiclass local initial 1 maximum 16
```

# ppp multilink multiclass remote apply

To configure the minimum number of Multiclass Multilink PPP (MCMP) receive classes that a local host will accept from its peer in a Conf-Request, use the **ppp multilink multiclass** command in interface configuration mode. To remove this setting, use the no form of this command.

```
ppp multilink multiclass remote apply min-number
no ppp multilink multiclass remote apply min-number
```

|                    |            |                                                                                            |
|--------------------|------------|--------------------------------------------------------------------------------------------|
| Syntax Description | min-number | Specifies the minimum number of receive classes in the Conf-Request. The range is 1 to 16. |
|--------------------|------------|--------------------------------------------------------------------------------------------|

|                 |                                      |
|-----------------|--------------------------------------|
| Command Default | The default is 2 if MCMP is enabled. |
|-----------------|--------------------------------------|

|               |                         |
|---------------|-------------------------|
| Command Modes | Interface configuration |
|---------------|-------------------------|

|                 |               |                              |
|-----------------|---------------|------------------------------|
| Command History | Release       | Modification                 |
|                 | Release 3.9.0 | This command was introduced. |

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Guidelines | <p>To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.</p> <p>This command is used to coerce the peer to accept a minimum number of MCMP classes. If the peer does not accept the minimum number of MCMP classes specified by this command, the local router will not bring up the PPP link.</p> |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|         |         |             |
|---------|---------|-------------|
| Task ID | Task ID | Operations  |
|         | ppp     | read, write |

|          |                                                                                                 |
|----------|-------------------------------------------------------------------------------------------------|
| Examples | The following example shows how to use the <b>ppp multilink multicast remove apply</b> command. |
|----------|-------------------------------------------------------------------------------------------------|

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RP0/CPU0:router(config-if)# ppp multilink multiclass remote apply 16
```

**Related Commands**

| Command                                                      | Description                                                                  |
|--------------------------------------------------------------|------------------------------------------------------------------------------|
| <a href="#">ppp ipcp dns, on page 861</a>                    | Configures the primary and secondary DNS IP addresses for the IPCP.          |
| <a href="#">ppp ipcp neighbor-route disable, on page 862</a> | Disables installation of a route to the peer address negotiated by IPCP.     |
| <a href="#">ppp ipcp peer-address default, on page 863</a>   | Specifies the default IPv4 address that is assigned to the peer by the IPCP. |
| <a href="#">ppp ms-chap hostname, on page 872</a>            | Configures the hostname for MS-CHAP authentication on an interface.          |

# ppp pap refuse

To refuse Password Authentication Protocol (PAP) authentication from peers requesting it, use the **ppp pap refuse** command in interface configuration mode. To allow PAP authentication, use the **no** form of this command.

**ppp pap refuse**  
**no ppp pap refuse**

| Syntax Description | This command has no keywords or arguments.                                                                                           |         |              |             |                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|-------------|------------------------------|
| Command Default    | PAP authentication is disabled.                                                                                                      |         |              |             |                              |
| Command Modes      | Interface configuration                                                                                                              |         |              |             |                              |
| Command History    | <table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>Release 2.0</td><td>This command was introduced.</td></tr> </table> | Release | Modification | Release 2.0 | This command was introduced. |
| Release            | Modification                                                                                                                         |         |              |             |                              |
| Release 2.0        | This command was introduced.                                                                                                         |         |              |             |                              |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **ppp pap refuse** command specifies that PAP authentication is disabled for all calls, meaning that all attempts by the peer to force the user to authenticate using PAP are refused.

If outbound Challenge Handshake Authentication Protocol (CHAP) has been configured (using the **ppp authentication** command), CHAP is suggested as the authentication method in the refusal packet.

| Task ID | <table> <tr> <th>Task ID</th><th>Operations</th></tr> <tr> <td>ppp</td><td>read, write</td></tr> <tr> <td>aaa</td><td>read, write</td></tr> </table> | Task ID | Operations | ppp | read, write | aaa | read, write |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|-----|-------------|-----|-------------|
| Task ID | Operations                                                                                                                                           |         |            |     |             |     |             |
| ppp     | read, write                                                                                                                                          |         |            |     |             |     |             |
| aaa     | read, write                                                                                                                                          |         |            |     |             |     |             |

**Examples**

The following example shows how to specify POS 0/3/0/1 using PPP encapsulation on the interface. This example shows PAP authentication being specified as disabled if a peer calls in requesting PAP authentication.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
```

```
RP/0/RP0/CPU0:router(config-if)# ppp pap refuse
```

**Related Commands**

| Command                                                      | Description                                                                                                                                                           |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| aaa authentication ppp                                       | Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.                                           |
| <a href="#">ppp authentication</a> , on page 854             | Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.                                   |
| <a href="#">ppp max-bad-auth</a> , on page 864               | Configures a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries.         |
| <a href="#">ppp pap sent-username password</a> , on page 884 | Enables remote PAP support for an interface, and includes the <b>sent-username</b> and <b>password</b> commands in the PAP authentication request packet to the peer. |

# ppp pap sent-username password

To enable remote Password Authentication Protocol (PAP) support for an interface, and to use the values specified for username and password in the PAP authentication request, use the **ppp pap sent-username password** command in interface configuration mode. To disable remote PAP support, use the **no** form of this command.

```
ppp pap sent-username username password [clear| encrypted] password
no ppp pap sent-username username password [clear| encrypted] password
```

## Syntax Description

|                  |                                                                           |
|------------------|---------------------------------------------------------------------------|
| <i>username</i>  | Username sent in the PAP authentication request.                          |
| <b>clear</b>     | (Optional) Specifies the cleartext encryption parameter for the password. |
| <b>encrypted</b> | (Optional) Indicates that the password is already encrypted.              |
| <i>password</i>  | Cleartext or already-encrypted password.                                  |

## Command Default

Remote PAP support is disabled.

## Command Modes

Interface configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ppp pap sent-username password** command to enable remote PAP support (for example, to respond to the peer’s request to authenticate with PAP) and to specify the parameters to be used when sending the PAP authentication request.

You must configure the **ppp pap sent-username password** command for each interface.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |
| aaa     | read, write |



## Examples

In the following example, a password is entered as a cleartext password, xxxx:

```
RP/0/RP0/CPU0:router(config-if)# ppp pap sent-username xxxx password notified
```

When the password is displayed (as shown in the following example, using the **show running-config** command), the password notified appears as 05080F1C2243:

```
RP/0/RP0/CPU0:router(config-if)# show running-config

interface POS0/1/0/0
description Connected to P1 CRS-8 POS 0/1/4/2
ipv4 address 10.12.32.2 255.255.255.0
encapsulation ppp
ppp pap sent-username P2_CRS-8 password encrypted 05080F1C2243
```

On subsequent logins, entering any of the three following commands would have the same effect of making xxxx the password for remote PAP authentication:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ppp pap sent-username xxxx password notified
RP/0/RP0/CPU0:router(config-if)# ppp pap sent-username xxxx password clear notified
RP/0/RP0/CPU0:router(config-if)# ppp pap sent-username xxxx encrypted 1514190900
```

## Related Commands

| Command                                                  | Description                                                                                                                                |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>aaa authentication ppp</b>                            | Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.                |
| <a href="#">ppp authentication</a> , on page 854         | Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.        |
| <a href="#">ppp multilink multiclass</a> , on page 877   | Refuses PAP authentication from peers requesting it                                                                                        |
| <a href="#">ppp timeout authentication</a> , on page 886 | Sets PPP authentication timeout parameters.                                                                                                |
| <b>show running-config</b>                               | Displays the contents of the currently running configuration file or the configuration for a specific interface, or map class information. |

# ppp timeout authentication

To set PPP authentication timeout parameters, use the **ppp timeout authentication** command in interface configuration mode. To reset the default value, use the **no** form of this command.

**ppp timeout authentication** *seconds*  
**no ppp timeout authentication**

Syntax Description

|                |                                                                                                                                     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <i>seconds</i> | Maximum time, in seconds, to wait for a response to an authentication packet. Range is from 3 to 30 seconds. Default is 10 seconds. |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------|

Command Default

*seconds*: 10

Command Modes

Interface configuration

Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The default authentication time is 10 seconds, which should allow time for a remote router to authenticate and authorize the connection and provide a response. However, it is also possible that it will take much less time than 10 seconds. In such cases, use the **ppp timeout authentication** command to lower the timeout period to improve connection times in the event that an authentication response is lost.



Note

The timeout affects connection times only if packets are lost.



Note

Although lowering the authentication timeout is beneficial if packets are lost, sending authentication requests faster than the peer can handle them results in churn and a slower connection time.

Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

## Examples

In the following example, PPP timeout authentication is set to 20 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp timeout authentication 20
```

## Related Commands

| Command                                          | Description                                                                                                                         |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>aaa authentication ppp</b>                    | Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.         |
| <a href="#">ppp authentication</a> , on page 854 | Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface. |

# ppp timeout retry

To set PPP timeout retry parameters, use the **ppp timeout retry** command in interface configuration mode. To reset the time value, use the **no** form of this command.

**ppp timeout retry** *seconds*  
**no ppp timeout retry**

|                    |                |                                                                                                                               |
|--------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <i>seconds</i> | Maximum time, in seconds, to wait for a response during PPP negotiation. Range is from 1 to 10 seconds. Default is 3 seconds. |
|--------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|

|                 |                   |
|-----------------|-------------------|
| Command Default | <i>seconds: 3</i> |
|-----------------|-------------------|

|               |                         |
|---------------|-------------------------|
| Command Modes | Interface configuration |
|---------------|-------------------------|

|                 |             |                              |
|-----------------|-------------|------------------------------|
| Command History | Release     | Modification                 |
|                 | Release 2.0 | This command was introduced. |

|                  |                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Guidelines | <p>To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.</p> <p>The <b>ppp timeout retry</b> command is useful for setting a maximum amount of time PPP should wait for a response to any control packet it sends.</p> |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|         |         |             |
|---------|---------|-------------|
| Task ID | Task ID | Operations  |
|         | ppp     | read, write |

|          |                                                                     |
|----------|---------------------------------------------------------------------|
| Examples | The following example shows the retry timer being set to 8 seconds: |
|----------|---------------------------------------------------------------------|

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0/CPU0:router(config-if)# ppp timeout retry 8
```

# redundancy

To enter the redundancy configuration mode to configure Multi-Router Automatic Protection Switching (MR-APS), use the **redundancy** command in global configuration mode.

## redundancy

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** Global configuration

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.9.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID | Operations |
|---------|---------|------------|
|         | ppp     | read       |

**Examples** The following example shows how to enter the redundancy configuration mode:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# redundancy
RP/0/RP0/CPU0:router(config-redundancy)#
```

# security ttl

To specify that the time-to-live (TTL) value in the IP header of the packet is used to validate that a packet is from the expected source, use the **security ttl** command in SSRP configuration mode. To remove the TTL requirement, use the no form of this command.

**security ttl max-hops** *number*  
**no security ttl max-hops** *number*

|                    |                                                                                                                                                                                                                                                                                                                                                 |                              |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Syntax Description | <div> <div><b>max-hops</b> <i>number</i></div> <div>Maximum number of hops between the peer routers.</div> </div>                                                                                                                                                                                                                               |                              |
| Command Default    | The <b>max-hops</b> default is 255.                                                                                                                                                                                                                                                                                                             |                              |
| Command Modes      | SSRP configuration                                                                                                                                                                                                                                                                                                                              |                              |
| Command History    | Release                                                                                                                                                                                                                                                                                                                                         | Modification                 |
|                    | Release 3.9.0                                                                                                                                                                                                                                                                                                                                   | This command was introduced. |
| Usage Guidelines   | <p>To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.</p> <p>If <b>max-hops</b> is not specified, the TTL value must be 255 for a packet to be accepted.</p> |                              |
| Task ID            | Task ID                                                                                                                                                                                                                                                                                                                                         | Operations                   |
|                    | ppp                                                                                                                                                                                                                                                                                                                                             | read, write                  |

Examples

The following example shows how to specify that the time-to-live (TTL) value in the IP header of a packet is used to validate that the packet is from the expected source:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ssrp profile Profile_1
RP/0/RP0/CPU0:router(config-ssrp)# peer ipv4 address 10.10.10.10
RP/0/RP0/CPU0:router(config-ssrp)# security ttl max-hops number 50
```

# show ppp interfaces

To display PPP state information for an interface, use the **show ppp interfaces** command in EXEC mode.

**show ppp interfaces** [**brief** | **detail**] {**all** | *type interface-path-id* | **location node-id**}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>brief</b>             | (Optional) Displays brief output for all interfaces on the router, for a specific POS interface instance, or for all interfaces on a specific node.                                                                                                                          |
| <b>detail</b>            | (Optional) Displays detailed output for all interfaces on the router, for a specific interface instance, or for all interfaces on a specific node.                                                                                                                           |
| <i>type</i>              | Interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                        |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>all</b>               | (Optional) Displays detailed PPP information for all nodes.                                                                                                                                                                                                                  |
| <b>location node-id</b>  | (Optional) Displays detailed PPP information for the designated node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.                                                                                                                        |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                                                                                                                |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Release 2.0   | This command was introduced.                                                                                                                |
| Release 3.9.0 | For ICSSO, when SSRP is configured, the <b>show ppp interfaces</b> command displays the SSO-State for LCP, IPCP, and authentication layers. |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

There are seven possible PPP states applicable for either the Link Control Protocol (LCP) or the Network Control Protocol (NCP).

The command output displays a summary of the interface as it is in the PPP Interface Descriptor Block (IDB). The output includes the following information (where applicable):

- Interface state
- Line protocol state
- Link Control Protocol (LCP) state
- Network Control Protocol (NCP) state
- Multilink PPP state
- Multilink PPP configuration
- Keepalive configuration
- Authentication configuration
- Negotiated MRUs
- Negotiated IP addresses

This command can display information for a single interface, all interfaces on a specified node, or all interfaces on the router.

Task ID

| Task ID | Operations |
|---------|------------|
| ppp     | read       |

Examples

The following example shows how to display PPP state information for a POS interface:

```
RP/0/RP0/CPU0:router# show ppp interface POS 0/2/0/3

POS0/2/0/3 is up, line protocol is up
 LCP: Open
 Keepalives enabled (10 sec)
 Local MRU: 4470 bytes
 Peer MRU: 4470 bytes
 Authentication
 Of Us: CHAP (Completed as 'test-user')
 Of Peer: PAP (Completed as 'peer-user')
 CDPCP: Listen
 IPCP: Open
 Local IPv4 address: 55.0.0.1
 Peer IPv4 address: 55.0.0.2
 Peer DNS Primary: 55.0.0.254
 Peer DNS Secondary: 155.0.0.254
 IPV6CP: Open
 Local IPv6 address: fe80::3531:35ff:fe55:5747/128
```



```

 Peer IPv6 address: fe80::3531:35ff:fe55:4213/128
MPLSCP: Stopped

```

The following example shows how to display PPP state information for a POS interface that is running as a Layer 2 attachment circuit:

```
RP/0/0/CPU0:# show ppp interface POS0/2/0/2
```

```

POS0/2/0/2 is up, line protocol is up
LCP: Open
Running as L2 AC

```

The following example shows how to display PPP state information for a multilink interface:

```
RP/0/RP0/CPU0:router:# show ppp interface Multilink 0/3/0/0/100
```

```

Multilink0/3/0/0/100 is up, line protocol is down
LCP: Open
SSO-State: Standby-Up
Keepalives disabled
IPCP: Open
SSO-State: Standby-Up
Local IPv4 address: 100.0.0.1
Peer IPv4 address: 100.0.0.2
IPV6CP: Open
Local IPv6 address: fe80::3531:35ff:fe55:4600/128
Peer IPv6 address: fe80::3531:35ff:fe55:3215/128
Multilink
Local MRRU: 1500 bytes
Peer MRRU: 1500 bytes
Local Endpoint Discriminator: 1234567812345678
Peer Endpoint Discriminator: 1111222233334444
MCMP classes: Local 4, Remote 2
Member links: 2 active, 6 inactive (min-active 2)
- Serial0/3/1/3/1 ACTIVE
- Serial0/3/1/3/2 ACTIVE
- Serial0/3/1/3/3 INACTIVE : LCP not negotiated
- Serial0/3/1/3/4 INACTIVE : Mismatching peer endpoint
- Serial0/3/1/3/5 INACTIVE : Mismatching peer auth name
- Serial0/3/1/3/6 INACTIVE : MRRU option rejected by Peer
- Serial0/3/1/3/7 INACTIVE : Mismatching local MCMP classes
- Serial0/3/1/3/8 INACTIVE : MCMP option rejected by peer

```

The following example shows how to display PPP state information for a serial interface:

```
RP/0/RP0/CPU0:router# show ppp interface Serial 0/3/1/3/1
```

```

Serial0/3/1/3/1 is down, line protocol is down
LCP: Open
SSO-State: Standby-Up
Keepalives enabled (10 sec)
Local MRU: 1500 bytes
Peer MRU: 1500 bytes
Local Bundle MRRU: 1500 bytes
Peer Bundle MRRU: 1500 bytes
Local Endpoint Discriminator: 1234567812345678
Peer Endpoint Discriminator: 1111222233334444
Local MCMP Classes: Not negotiated
Remote MCMP Classes: Not negotiated
Authentication
Of Us: CHAP (Completed as 'test-user')
Of Peer: PAP (Completed as 'peer-user')
Multilink
Multilink group id: 100
Member status: ACTIVE

```

**Table 83: show ppp interfaces Field Descriptions**

| Field          | Description                                                                                                                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ack-Rcvd       | Configuration acknowledgement was received; waiting for peer to send configuration request.                                                                                                                                                 |
| Ack-Sent       | Configuration acknowledgement was sent; waiting for peer to respond to configuration request.                                                                                                                                               |
| Authentication | Type of user authentication configured on the local equipment and on the peer equipment. Possible PPP authentication protocols are Challenge Handshake Authentication Protocol (CHAP), MS-CHAP, and Password Authentication Protocol (PAP). |
| Closed         | Lower layer is up, but this layer is not required.                                                                                                                                                                                          |
| Closing        | Shutting down due to local change.                                                                                                                                                                                                          |
| Initial        | Connection is idle.                                                                                                                                                                                                                         |

| Field     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IPCP      | <p>IP Control Protocol (IPCP) state. The seven possible states that may be displayed are as follows:</p> <ul style="list-style-type: none"> <li>• Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state.</li> <li>• Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent.</li> <li>• Closed—IPCP is not currently trying to negotiate.</li> <li>• Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received.</li> <li>• Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered.</li> <li>• Stopping—A Terminate-Request has been sent and the Restart timer is running, but a IPCP-Ack has not yet been received. Req-Sent.</li> <li>• ACKsent—IPCP has received a request and has replied to it.</li> <li>• ACKrcvd—IPCP has received a reply to a request it sent.</li> <li>• Open—IPCP is functioning properly.</li> </ul> |
| Keepalive | Keepalive setting and interval in seconds for echo request packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LCP                | <p>Indicates the current state of LCP. The state of the LCP will report the following states:</p> <ul style="list-style-type: none"> <li>• Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state.</li> <li>• Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent.</li> <li>• Closed— LCP is not currently trying to negotiate.</li> <li>• Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received.</li> <li>• Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered.</li> <li>• Stopping—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Req-Sent.</li> <li>• ACKsent—LCP has received a request and has replied to it.</li> <li>• ACKrcvd—LCP has received a reply to a request it sent.</li> <li>• Open—LCP is functioning properly</li> </ul> |
| Local IPv4 address | IPv4 address for the local interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Local MRU          | Maximum receive unit. The maximum size of the information transported, in bytes, in the PPP packet received by the local equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Open               | Connection open.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OSICP             | <p>Open System Interconnection Control Protocol (OSICP) state. The possible states that may be displayed are as follows:</p> <ul style="list-style-type: none"> <li>• Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state.</li> <li>• Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent.</li> <li>• Closed—OSICP is not currently trying to negotiate.</li> <li>• Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received.</li> <li>• Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered.</li> <li>• Stopping—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Req-Sent.</li> <li>• ACKsent—OSICP has received a request and has replied to it.</li> <li>• ACKrcvd—OSICP has received a reply to a request it sent.</li> <li>• Open—OSICP is functioning properly.</li> </ul> |
| Peer IPv4 address | IPv4 address for the peer equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Peer MRU          | Maximum receive unit. The maximum size of the information transported, in bytes, in the PPP packet received by the peer equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Req-Sent          | Configuration request was sent; waiting for peer to respond.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

show ppp interfaces

| Field    | Description                                          |
|----------|------------------------------------------------------|
| Starting | This layer is required, but lower layer is down.     |
| Stopped  | Listening for a configuration request.               |
| Stopping | Shutting down as a result of interactions with peer. |

# show ppp sso alerts

To display all Inter-Chassis Stateful Switchover (ICSSO) alerts that have occurred, use the **show ppp sso alerts** command in EXEC mode.

**show ppp sso alerts location** *node-id*

## Syntax Description

|                                |                                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i> | Specifies the full qualified path of a specific node in the format <i>rack/slot/module</i> . |
|--------------------------------|----------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command displays the following information for alerts that have prevented a standby session from being brought to the Standby-Up state using replicated data.

- The interfaces on which the alerts have occurred
- The layer in which the error has occurred
- A short description of the error



### Note

Only one error is reported for each layer for each interface. The error displayed is the most recent error that has occurred.

## Task ID

| Task ID | Operations |
|---------|------------|
| ppp     | read       |

Examples

The following example shows how to display all ICSSO alerts that have occurred:

```
RP/0/RP0/CPU0:router# show ppp sso errors location 0/3/cpu0
```

| Intf<br>Name  | Layer<br>with error | SSO<br>Error                            |
|---------------|---------------------|-----------------------------------------|
| -----         |                     |                                         |
| Mu0/3/0/0/100 | IPCP                | Unsupported IPCP option 0x07            |
| Se0/3/1/3/1:0 | LCP                 | Unacceptable value for LCP MRU option   |
| Se0/3/1/3/2:0 | of-us-auth          | Incorrect Authentication protocol, CHAP |
| Se0/3/1/3/3:0 | of-peer-auth        | Invalid CHAP Authentication options     |
| Se0/3/1/3/4:0 | LCP                 | Inconsistent LCP MRRU options           |



## show ppp sso state

To display the Inter-Chassis Stateful Switchover (ICSSO) states of a Point-to-Point Protocol (PPP) session running under a particular Multi-Router Automatic Protection Switching (MR-APS) group, use the **show ppp sso state** command in EXEC mode.

**show ppp sso state** *group group-id location node-id*

### Syntax Description

|                                |                                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------|
| <b>group</b> <i>group-id</i>   | Specifies the redundancy group number. The range is 1 to 32.                                 |
| <b>location</b> <i>node-id</i> | Specifies the full qualified path of a specific node in the format <i>rack/slot/module</i> . |

### Command Default

If group is not specified, states are displayed for all redundancy groups.

### Command Modes

EXEC

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command shows the states of these session layers:

- LCP
- of-us authentication
- of-peer authentication
- IPCP



#### Note

When an interface is in Standby mode, it is ready to forward traffic immediately after a switchover, if all the session layers, including IPCP, are in the S-Negd state.

show ppp sso state

Task ID

| Task ID | Operations |
|---------|------------|
| ppp     | read       |

Examples

The following example shows how to display the ICSSO states for PPP running under a redundancy group:

```
RP/0/RP0/CPU0:router# show ppp sso state location 0/3/cpu0

Not-Ready : The session is not yet ready to run as Active or Standby
S-UnNegd : In Standby mode, no replication state received yet
A-Down : In Active mode, lower layer not yet up
Deact'ing : Session was Active, now going Standby
A-UnNegd : In Active mode, not fully negotiated yet
S-Negd : In Standby mode, replication state received and pre-programmed
Act'ing : Session was Standby and pre-programmed, now going Active
A-Negd : In Active mode, fully negotiated and up
- : This layer not running

SSO-Group 1
Sess-ID Ifname | LCP of-us of-peer
-----+-----
1 Multilink0/3/0/0/100 : S-Negd S-Negd S-Negd S-Negd
2 Multilink0/3/0/0/101 : S-UnNegd S-UnNegd S-UnNegd Not-Ready
3 Serial0/3/1/3/1 : S-Negd S-Negd S-Negd -
4 Serial0/3/1/3/2 : A-Negd A-Negd A-Negd A-UnNegd
5 Serial0/3/1/3/3 : A-Down Not-Ready Not-Ready -
6 Serial0/3/1/3/4 : A-Up A-Up A-Up A-Up

SSO-Group 1
Sess-ID Ifname | LCP of-us of-peer
-----+-----
1 Multilink0/3/0/0/102 : S-Negd S-Negd S-Negd S-Negd
2 Serial0/3/1/3/5 : S-Negd S-Negd S-Negd -
3 Serial0/3/1/3/6 : A-Negd A-Negd A-Negd A-UnNegd
```

# show ppp sso summary

To display the number of sessions in each Inter-Chassis Stateful Switchover (ICSSO) state for each session layer, use the **show ppp sso summary** command in EXEC mode.

**show ppp sso summary location** *node-id*

## Syntax Description

|                                |                                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------|
| <b>location</b> <i>node-id</i> | Specifies the full qualified path of a specific node in the format <i>rack/slot/module</i> . |
|--------------------------------|----------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command displays information for these session layers:

- LCP
- of-us
- of-peer authentication
- IPCP



### Note

Only sessions with Session State Redundancy Protocol (SSRP) configured are displayed.

## Task ID

| Task ID | Operations |
|---------|------------|
| ppp     | read       |

Examples

The following example shows how to display the number of sessions in each ICSSO state for each session layer.

```
RP/0/RP0/CPU0:router# show ppp sso summary location 0/3/cpu0

Not-Ready : The session is not yet ready to run as Active or Standby
Stby-UnNegd : In Standby mode, no replication state received yet
Act-Down : In Active mode, lower layer not yet up
Deactivating : Session was Active, now going Standby
Act-UnNegd : In Active mode, not fully negotiated yet
Stby-Negd : In Standby mode, replication state received and pre-programmed
Activating : Session was Standby and pre-programmed, now going Active
Act-Negd : In Active mode, fully negotiated and up
- : This layer not running
```

| Layer        | Total | Not-Ready | Stby-UnNegd | Act-Down | Deactivating | Act-UnNegd | Stby-Negd | Activating | Act-Negd |
|--------------|-------|-----------|-------------|----------|--------------|------------|-----------|------------|----------|
| LCP          | 20    | 2         | 5           | 0        | 0            | 3          | 6         | 0          | 4        |
| of-us-auth   | 20    | 10        | 2           | 0        | 0            | 1          | 4         | 0          | 3        |
| of-peer-auth | 20    | 10        | 3           | 0        | 0            | 2          | 3         | 0          | 2        |
| IPCP         | 10    | 1         | 2           | 1        | 0            | 3          | 2         | 0          | 1        |

## ssrp group

To attach an Session State Redundancy Protocol (SSRP) group on an interface, use the **ssrp group** command in interface configuration mode. To remove the SSRP group from the interface, use the no form of this command.

**ssrp group** *group-number* **id** *id-number* **ppp**

### Syntax Description

|                            |                                                       |
|----------------------------|-------------------------------------------------------|
| <i>group-number</i>        | SSRP group number. The range is 1 to 65535.           |
| <b>id</b> <i>id-number</i> | SSRP identifier number. The range is 1 to 4294967295. |
| <b>ppp</b>                 | Specifies point-to-point protocol.                    |

### Command Default

No default behavior or values

### Command Modes

Interface configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The group must be configured first on a specific location (linecard) and then assigned to the interface. The redundancy ID must be unique within the group. This command specifies a list the protocols that the group can replicate. Currently only PPP is supported.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

### Examples

The following example shows how to

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
```

```
RP/0/RP0/CPU0:router(config-if)# ssrp group 1 id 1 ppp
```

## ssrp location

To specify the node on which to create a Session State Redundancy Protocol (SSRP) group and enter the SSRP node configuration mode, use the **ssrp location** command in global configuration mode.

**ssrp location** *node\_id*

### Syntax Description

|                |                                                                                              |
|----------------|----------------------------------------------------------------------------------------------|
| <i>node_id</i> | Specifies the full qualified path of a specific node in the format <i>rack/slot/module</i> . |
|----------------|----------------------------------------------------------------------------------------------|

### Command Default

No default behavior or values

### Command Modes

Global configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The location specifies the card on which an SSRP group is created.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

### Examples

The following example shows how to create an SSRP group on a specified node for use by any interface on the card:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ssrp location 0/1/cpu0
RP/0/RP0/CPU0:router(config-ssrp-node)#
```

# ssrp profile

To configure a Session State Redundancy Protocol (SSRP) profile and enter the SSRP configuration mode, use the **ssrp profile** command in global configuration mode. To remove the profile, use the no form of this command.

```
ssrp profile profile-name
no ssrp profile profile-name
```

|                    |                                                                            |
|--------------------|----------------------------------------------------------------------------|
| Syntax Description | <div> <div>profile-name</div> <div>Name of this SSRP profile.</div> </div> |
|--------------------|----------------------------------------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| Command Default | No default behavior or values |
|-----------------|-------------------------------|

|               |                      |
|---------------|----------------------|
| Command Modes | Global configuration |
|---------------|----------------------|

|                 |                                                                               |
|-----------------|-------------------------------------------------------------------------------|
| Command History | <div> <div>Release</div> <div>Modification</div> </div>                       |
|                 | <div> <div>Release 3.9.0</div> <div>This command was introduced.</div> </div> |

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Guidelines | <div> <p>To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.</p> <p>A Session State Redundancy Protocol (SSRP) profile allows the same SSRP configuration to be shared across multiple groups. The same profile can be attached to multiple groups across the router. The group must be configured before the interface that uses the group can be configured. The group number is used in the TCP port number so, the group number must be unique across the router.</p> </div> |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|         |                                                       |
|---------|-------------------------------------------------------|
| Task ID | <div> <div>Task ID</div> <div>Operations</div> </div> |
|         | <div> <div>ppp</div> <div>read, write</div> </div>    |

|          |                                                               |
|----------|---------------------------------------------------------------|
| Examples | The following example shows how to configure an SSRP profile: |
|----------|---------------------------------------------------------------|

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ssrp profile Profile_1
RP/0/RP0/CPU0:router(config-ssrp)#
```





# SONET Controller Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring SONET operation, using Layer 1 SONET transport technology, on the Cisco CRS Router.

The configuration of the SONET controller includes SONET Automatic Protection Switch (APS), which is a feature offering recovery from fiber (external) or equipment (interface and internal) failures at the SONET line layer. You must configure a SONET controller before you can configure a Packet-over-SONET/SDH (POS) interface or a Spatial Reuse Protocol (SRP) interface.

All SONET-related configurations of a SONET-based physical port are grouped under the SONET controller configuration submode. The SONET path-related configuration commands are grouped under the SONET path submode.

- [ais-shut \(SONET\), page 911](#)
- [ais-shut \(SONET path\), page 913](#)
- [aps group, page 915](#)
- [aps group \(global\), page 918](#)
- [authenticate \(PGP\), page 920](#)
- [b3-ber-prdi, page 922](#)
- [channel local, page 923](#)
- [channel remote, page 925](#)
- [clear counters sonet, page 927](#)
- [clock source \(SONET\), page 929](#)
- [controller \(SONET\), page 931](#)
- [delay clear, page 933](#)
- [delay trigger, page 935](#)
- [down-when-looped, page 937](#)
- [force, page 938](#)
- [framing \(SONET\), page 940](#)

- [line delay clear](#), page 942
- [line delay trigger](#), page 944
- [lockout](#), page 946
- [loopback \(SONET\)](#), page 948
- [manual](#), page 950
- [overhead \(SONET\)](#), page 952
- [overhead \(SONET path\)](#), page 954
- [path delay clear](#), page 956
- [path delay trigger](#), page 958
- [path \(SONET\)](#), page 960
- [report \(SONET\)](#), page 962
- [report \(SONET path\)](#), page 964
- [revert](#), page 966
- [scrambling disable \(SONET path\)](#), page 968
- [show aps](#), page 970
- [show aps agents](#), page 972
- [show aps group](#), page 974
- [show controllers pos](#), page 977
- [show controllers sonet](#), page 983
- [shutdown \(SONET\)](#), page 991
- [signalling](#), page 993
- [timers \(APS\)](#), page 995
- [threshold \(SONET\)](#), page 997
- [threshold \(SONET path\)](#), page 999
- [uneq-shut \(SONET path\)](#), page 1001
- [unidirectional](#), page 1002

## ais-shut (SONET)

To enable automatic insertion of a line alarm indication signal (LAIS) in the sent SONET signal whenever the SONET port enters the administrative shutdown state, use the **ais-shut** command in SONET/SDH configuration mode. To disable automatic insertion of a LAIS, use the **no** form of this command.

**ais-shut**

**no ais-shut**

**Syntax Description** This command has no keywords or arguments.

**Command Default** This command is disabled by default; no AIS is sent.

**Command Modes** SONET/SDH configuration

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | Release 2.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When the line is placed in administrative shutdown state, use the **ais-shut** command to send a signal to downstream equipment that indicates that there is a problem with the line.

The **ais-shut** command is ignored if automatic protection switching (APS) is running for the corresponding port, because the setting must be enabled for proper APS operation.

For SONET ports that do not have hardware support for LAIS insertion, the **ais-shut** command is disabled.

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

**Examples** In the following example, the alarm indication is forced on the SONET OC-3 controller:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RP0/CPU0:router(config-sonet)# ais-shut
```

Related Commands

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers. |

## ais-shut (SONET path)

To enable automatic insertion of path alarm indication signal (PAIS) in the sent SONET signal whenever the SONET path enters the administratively down state, use the **ais-shut** command in SONET/SDH path configuration mode. To disable automatic insertion of PAIS in the SONET signal, use the **no** form of this command.

**ais-shut**

**no ais-shut**

**Syntax Description** This command has no keywords or arguments.

**Command Default** This command is disabled by default; no AIS is sent.

**Command Modes** SONET/SDH path configuration

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | Release 2.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ais-shut** command to enable automatic insertion of PAIS in the appropriate sent SONET path overhead whenever the corresponding SONET path enters the administratively down state.

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

**Examples** The following example shows the alarm indication being enabled on all paths:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# path
RP/0/RP0/CPU0:router(config-sonet-path)# ais-shut
```

Related Commands

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers. |

## aps group

To manually switch an automatic protection switching (APS) channel, use the **aps group** command in EXEC configuration mode.

**aps group** *number* {**force**|**manual**} {**0**|**1**} {**disable**|**enable**}

### Syntax Description

|                |                                                                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>number</i>  | Number of the APS group. Range is from 1 to 255.                                                                                                                                                     |
| <b>force</b>   | Sends a forced APS request at the local end of a SONET link with the assigned channel number.                                                                                                        |
| <b>manual</b>  | Sends a manual APS request at the local end of a SONET link with the assigned channel number, which is implemented when no other higher-priority user-initiated or automatic requests are in effect. |
| <b>0</b>       | Specifies that the protect channel should be switched.                                                                                                                                               |
| <b>1</b>       | Specifies that the working channel should be switched.                                                                                                                                               |
| <b>disable</b> | Stops sending the SONET K1/K2 bit pattern that informs the remote end to switch ports.                                                                                                               |
| <b>enable</b>  | Starts sending a SONET K1/K2 bit pattern to inform the remote end to switch ports.                                                                                                                   |

### Command Default

No default behavior or values

### Command Modes

EXEC

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

In a multirouter APS topology, a manual or force request is supported only on the protect router.

Specify **0** or **1** to identify on which channel the traffic should be stopped and switched to the other channel. Therefore, **force 0** or **manual 0** moves traffic from the protect to the working channel, and **force 1** or **manual 1** moves traffic from the working to the protect channel.

Use the **force** keyword to manually switch the traffic to a protect channel. For example, if you need to change the fiber connection, you can manually force the working channel to switch to the protect interface.

A forced switch can be used to override an automatic (Signal Failed Signal Degraded) or a manual switch request. A lockout request (using the **lockout** command) overrides a force request.

**Note**

If a request of equal or higher priority is in effect, you cannot use the **force** keyword to initiate a forced APS request at the local end of the SONET link.

Use the **manual** keyword to manually switch the circuit to a protect channel. For example, you can use this feature when you need to perform maintenance on the working channel. If a protection switch is already up, you can also use the **manual** keyword to revert the communication link to the working channel before the wait to restore (WTR) time period has expired. The WTR time period is set by the **revert** command. Use the **no** form of this command to cancel the switch.

A manual switch request can be used to control which channel carries the traffic when no other higher-priority user-initiated or automatic requests are in effect.

The manual request has the lowest priority among all user-initiated or automatic requests. Any other such requests override a manual request.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following examples show how to use the **aps group** command in EXEC mode to force or manually switch traffic, and enable and disable sending of the K1/K2 bit pattern to signal the switchover to the remote end:

```
RP/0/RP0/CPU0:router# aps group 1 force 1 enable
RP/0/RP0/CPU0:router# aps group 1 force 1 disable
```

```
RP/0/RP0/CPU0:router# aps group 1 manual 1 enable
RP/0/RP0/CPU0:router# aps group 1 manual 1 disable
```

```
RP/0/RP0/CPU0:router# aps group 1 force 0 enable
RP/0/RP0/CPU0:router# aps group 1 force 0 disable
```

```
RP/0/RP0/CPU0:router# aps group 1 manual 0 enable
RP/0/RP0/CPU0:router# aps group 1 manual 0 disable
```

**Related Commands**

| Command                                         | Description                                                                                                                       |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode.                                        |
| <a href="#">lockout, on page 946</a>            | Overrides a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic. |



| Command                                 | Description                                                                                                                     |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">revert, on page 966</a>     | Enables automatic switchover from the protect interface to the working interface after the working interface becomes available. |
| <a href="#">signalling, on page 993</a> | Configures the K1K2 overhead byte signaling protocol used for APS.                                                              |
| <a href="#">show aps, on page 970</a>   | Displays the operational status for all configured SONET APS groups.                                                            |

## aps group (global)

To add an automatic protection switching (APS) group and enter APS group configuration mode, use the **aps group** command in global configuration mode. To remove a group, use the **no** form of this command.

**aps group** *number*

**no aps group** *number*

### Syntax Description

|               |                                              |
|---------------|----------------------------------------------|
| <i>number</i> | Number of the group. Range is from 1 to 255. |
|---------------|----------------------------------------------|

### Command Default

No APS groups are defined.

### Command Modes

Global configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An APS group contains one protect (P) SONET port and one working (W) SONET port. The working and protect ports can reside on the same logical channel (LC), on different LCs in the same router, or on different routers. One APS group must be configured for each protect port and its corresponding working ports.

Use the **aps group (global)** command to enter APS group configuration mode and configure APS connections with other SONET equipment.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to use the **aps group** command in global configuration mode to configure APS group 1 and enter APS group configuration mode:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)#
```

**Related Commands**

| Command                                         | Description                                                                                                                              |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group, on page 915</a>          | Manually switches an APS channel.                                                                                                        |
| <a href="#">authenticate (PGP), on page 920</a> | Configures the authentication string for the PGP message exchange between the protect and working routers.                               |
| <a href="#">channel local, on page 923</a>      | Assigns local SONET physical ports as SONET APS channels in the current APS group.                                                       |
| <a href="#">channel remote, on page 925</a>     | Assigns a port and interface that is physically located in a remote router as a SONET working or protect APS channel.                    |
| <a href="#">lockout, on page 946</a>            | Overrides a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic.        |
| <a href="#">revert, on page 966</a>             | Enables automatic switchover from the protect interface to the working interface after the working interface becomes available.          |
| <a href="#">signalling, on page 993</a>         | Configures the K1K2 overhead byte signaling protocol used for APS.                                                                       |
| <a href="#">timers (APS), on page 995</a>       | Changes the time between hello packets and the time before the protect interface process declares a working interface router to be down. |
| <a href="#">unidirectional, on page 1002</a>    | Configures a protect interface for unidirectional mode.                                                                                  |
| <a href="#">show aps, on page 970</a>           | Displays the operational status for all configured SONET APS groups.                                                                     |

# authenticate (PGP)

To configure the authentication string for the Protect Group Protocol (PGP) message exchange between the protect and working routers, use the **authenticate** command in APS group configuration mode. To revert to the default authentication string, use the **no** form of this command.

**authenticate** *string*

**no authenticate** *string*

## Syntax Description

|               |                                                                                                                                                                                                                 |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>string</i> | Authentication string that the router uses to authenticate PGP message exchange between protect or working routers. The maximum length of the string is eight alphanumeric characters. Spaces are not accepted. |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

The default authentication string is “cisco.”

## Command Modes

APS group configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **authenticate** command to configure the authentication string for the PGP message exchange between the protect and working routers. Use the **no** form of this command to revert to the default authentication string.

The **authenticate** command applies only in multirouter automatic protection switching (APS) group configurations.

In multirouter APS topologies, the protect and working routers communicate with each other through the User Datagram Protocol (UDP)-based Pretty Good Privacy protocol. Each Pretty Good Privacy packet contains an authentication string used for packet validation. The authentication string on all routers involved in the same APS group operation must match for proper APS operation.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example enables authentication for APS group 1 in abctown:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# authenticate abctown
```

## Related Commands

| Command                                         | Description                                                                                                           |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode.                            |
| <a href="#">channel local, on page 923</a>      | Assigns local SONET physical ports as SONET APS channels in the current APS group.                                    |
| <a href="#">channel remote, on page 925</a>     | Assigns a port and interface that is physically located in a remote router as a SONET working or protect APS channel. |
| <a href="#">show aps, on page 970</a>           | Displays the operational status for all configured SONET APS groups.                                                  |

## b3-ber-prdi

To enable sending of a path-level remote defect indication (PRDI) when the bit error rate (BER) bit interleaved parity (BIP) B3 threshold is exceeded, use the **b3-ber-prdi** command in SONET/SDH path configuration mode. To disable sending a PRDI, use the **no** form of this command.

**b3-ber-prdi**

**no b3-ber-prdi**

**Syntax Description** This command has no keywords or arguments.

**Command Default** This command is disabled by default; a PRDI is not sent.

**Command Modes** SONET/SDH path configuration

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.9.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

**Examples** The following example shows a PRDI enabled on all paths:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# path
RP/0/RP0/CPU0:router(config-sonet-path)# b3-ber-prdi
```

| Related Commands | Command                                                              | Description                                                        |
|------------------|----------------------------------------------------------------------|--------------------------------------------------------------------|
|                  | <a href="#">path (SONET)</a> , <a href="#">on page 960</a>           | Enters SONET/SDH path configuration mode.                          |
|                  | <a href="#">show controllers sonet</a> , <a href="#">on page 983</a> | Displays information about the operational status of SONET layers. |

# channel local

To assign local SONET physical ports as SONET automatic protection switching (APS) channels in the current APS group, use the **channel local** command in APS group configuration mode. To return to the default setting, use the **no** form of this command.

**channel** {0| 1} **local** [**preconfigure**] **sonet** *interface-path-id*

**no channel** {0| 1} **local** [**preconfigure**] **sonet** *interface-path-id*

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>{0  1}</b>            | Assigns a protect or working channel type. <b>0</b> is protect, <b>1</b> is working.                                                                                                                                                                                                    |
| <b>preconfigure</b>      | (Optional) Specifies a SONET preconfiguration. This keyword is used only when a modular services or line card is not physically installed in a slot.                                                                                                                                    |
| <b>sonet</b>             | Specifies a SONET interface type.                                                                                                                                                                                                                                                       |
| <b>interface-path-id</b> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show controllers sonet</b> command to see a list of all controllers currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

A SONET APS local channel is not assigned.

## Command Modes

APS group configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.

- *module*: Module number. A physical layer interface module (PLIM) is always 0.
- *port*: Physical port number of the interface.

- If specifying a virtual interface, the number range varies, depending on interface type.

Use the **channel local** command to designate SONET physical ports as SONET APS channels in the current APS group. Use the **channel remote** command to assign channels that are physically located in a different router.

Preconfigured interfaces are supported.

If the protect channel is local, it must be assigned using a **channel** command *before* any of the working channels are assigned. The reason is that having only a working channel assigned is a valid configuration for a working router in a multirouter APS topology and further attempts to configure a local protect channel are rejected.

The interface type must be a SONET controller.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to configure SONET 0/2/0/2 as a local protect channel:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# channel 0 local SONET 0/2/0/2
```

## Related Commands

| Command                                         | Description                                                                                                           |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode.                            |
| <a href="#">channel remote, on page 925</a>     | Assigns a port and interface that is physically located in a remote router as a SONET working or protect APS channel. |
| <a href="#">show aps, on page 970</a>           | Displays the operational status for all configured SONET APS groups.                                                  |



# channel remote

To assign a port and interface that is physically located in a remote router as a SONET working or protect automatic protection switching (APS) channel, use the **channel remote** command in APS group configuration mode. To return to the default setting, use the **no** form of this command.

**channel** {0|1} **remote** *ip-address*

**no channel** {0|1} **remote** *ip-address*

## Syntax Description

|                   |                                                                                      |
|-------------------|--------------------------------------------------------------------------------------|
| {0 1}             | Assigns a protect or working channel type. <b>0</b> is protect, <b>1</b> is working. |
| <i>ip-address</i> | Remote router IP address in A.B.C.D format.                                          |

## Command Default

A SONET APS remote channel is not assigned.

## Command Modes

APS group configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **channel remote** command to assign working or protect channels that are physically located in a different router.

Use the **channel local** command to assign channels in the local router.



### Note

The **channel remote** command should not be used in single-router APS topologies.

The *IP address* of the remote router is required only if a working channel configured as the protect router contacts all working routers.

Specifying a remote protect channel is optional. If you do not specify a remote protect channel, the default value of 0.0.0.0 is used. The protect router is always the one that contacts the working router. The working router replies to the protect router using the source address extracted from the incoming messages as the destination address. If an address other than 0.0.0.0 (the default value) is specified, the working router always uses that address when sending messages to the protect router.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

In the following examples, a remote channel with IP address 192.168.1.1 is assigned as the working channel:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# channel 1 remote 192.168.1.1
```

**Related Commands**

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">channel local, on page 923</a>      | Assigns local SONET physical ports as SONET APS channels in the current APS group.         |
| <a href="#">show aps, on page 970</a>           | Displays the operational status for all configured SONET APS groups.                       |

# clear counters sonet

To clear SONET counters for a specific SONET controller, use the **clear counters sonet** command in EXEC mode.

**clear counters sonet** *interface-path-id*

## Syntax Description

|                          |                                                                                                                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.                                                                                                                                                                                   |
| <b>Note</b>              | Use the <b>show controllers sonet</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Use the **clear counters sonet** command to clear SONET counters for a specific SONET controller.

**Task ID**

| Task ID        | Operations  |
|----------------|-------------|
| sonet-sdh      | read, write |
| basic-services | read, write |

**Examples**

The following example shows the SONET counters being cleared on the SONET interface:

```
RP/0/RP0/CPU0:router# clear counters sonet 0/1/0/0
```

**Related Commands**

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers. |

## clock source (SONET)

To set the clock source of the sent signal on SONET ports, use the **clock source** command in SONET/SDH configuration mode. To cancel a clock source setting, use the **no** form of this command.

**clock source** {internal| line}

**no clock source** {internal| line}

### Syntax Description

|                 |                                                                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>internal</b> | Specifies that the controller will clock its sent data from its internal clock.                                                                    |
| <b>line</b>     | Specifies that the controller will clock its sent data from a clock recovered from the receive data stream of the line. This is the default value. |

### Command Default

The clock source for the controller is **line**.

### Command Modes

SONET/SDH configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **clock source** command to configure which reference clock is used by the sender.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

In the following example, the SONET controller is configured to clock its sent data from its internal clock:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# clock source internal
```

Related Commands

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers. |

## controller (SONET)

To enter SONET/SDH configuration mode so that you can configure a specific SONET controller, use the **controller (SONET)** command in global configuration mode. To return to the default state, use the **no** form of this command.

**controller** [**preconfigure**] **sonet** *interface-path-id*

**no controller** [**preconfigure**] **sonet** *interface-path-id*

### Syntax Description

|                          |                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>preconfigure</b>      | (Optional) Specifies a SONET preconfiguration. Use the <b>preconfigure</b> keyword only when a modular services card is not physically installed in a slot.                                                                                                                 |
| <b>sonet</b>             | Enters the SONET configuration mode or configures the SONET port controller specified by <i>interface-path-id</i> .                                                                                                                                                         |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

### Command Default

No default behavior or values

### Command Modes

Global configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.

◦ *port*: Physical port number of the interface.

- If specifying a virtual interface, the number range varies, depending on interface type.

Use the **path (SONET)** command to enter SONET/SDH path configuration mode to specify other SONET options for a SONET path.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Task ID

## Examples

The following example shows how to enter SONET/SDH configuration mode for the SONET controller in slot number 2:

```
RP/0/RP0/CPU0:router(config)# controller SONET 0/2/0/1
RP/0/RP0/CPU0:router(config-sonet)#
```

The following example shows how to configure the SONET controller path (0/2/0/1) to send a path-level remote defect indication (PRDI) when the bit error rate (BER) bit interleaved parity (BIP) B3 threshold is exceeded. :

```
RP/0/RP0/CPU0:router(config)# controller SONET 0/2/0/1 path b3-ber-prdi
RP/0/RP0/CPU0:router(config-sonet)#
```

## Related Commands

| Command                                              | Description                                                        |
|------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">path (SONET)</a> , on page 960           | Enters SONET/SDH path configuration mode.                          |
| <a href="#">show controllers sonet</a> , on page 983 | Displays information about the operational status of SONET layers. |



# delay clear

To configure the amount of time before a Synchronous Transport Signal (STS) path delay trigger alarm is cleared, use the **delay clear** command in STS path configuration mode. To return the command to its default setting, use the **no** form of this command.

**delay clear** *value*

**no delay clear** *value*

## Syntax Description

|              |                                                                                                                                      |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <i>value</i> | Value, in milliseconds, before an STS path delay trigger alarm is cleared. The range is from 0 to 180000. The default is 10 seconds. |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

The default is 10 seconds.

## Command Modes

STS path configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to specify that STS path delay trigger alarms should be cleared after 7000 milliseconds:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/3
RP/0/RP0/CPU0:router(config-sonet)# sts 1
RP/0/RP0/CPU0:router(config-stsPath)# delay clear 7000
```

delay clear

Related Commands

| Command                                    | Description                                             |
|--------------------------------------------|---------------------------------------------------------|
| <a href="#">delay trigger, on page 935</a> | Configures a time value for the STS path delay trigger. |

## delay trigger

To configure a time value for the Synchronous Transport Signal (STS) path delay trigger, use the **delay trigger** command in STS path configuration mode. To return the command to its default setting, use the **no** form of this command.

**delay trigger** *value*

**no delay trigger** *value*

### Syntax Description

|              |                                                                                                                                                          |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>value</i> | Value, in milliseconds, for the STS path delay trigger. The range is from 0 through 60000. The default is 0 seconds, which means that there is no delay. |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

The default is 0 seconds, which means that there is no delay.

### Command Modes

STS path configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If the timer for the STS path delay trigger expires, an alarm is declared.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to set the STS path delay trigger to 6000 milliseconds:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/3
RP/0/RP0/CPU0:router(config-sonet)# sts 1
RP/0/RP0/CPU0:router(config-stsPath)# delay trigger 6000
```

Related Commands

| Command                                  | Description                                                                     |
|------------------------------------------|---------------------------------------------------------------------------------|
| <a href="#">delay clear, on page 933</a> | Configures the amount of time before a STS path delay trigger alarm is cleared. |

# down-when-looped

To configure a SONET controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in SONET/SDH configuration mode.

## down-when-looped

**Syntax Description** This command has no keywords or arguments.

**Command Default** The default is disabled.

**Command Modes** SONET/SDH configuration

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.6.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command does not have a **no** form.

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

**Examples** The following example shows how to configure a SONET controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RP0/CPU0:router(config-sonet)# down-when-looped
```

down-when-looped is a traffic-affecting operation

| Related Commands | Command                                                        | Description                                        |
|------------------|----------------------------------------------------------------|----------------------------------------------------|
|                  | <a href="#">loopback (SONET)</a> , <a href="#">on page 948</a> | Configures the SONET controller for loopback mode. |

# force

To initiate a forced automatic protection switching (APS) request at the local end of the SONET link, use the **force** command in EXEC configuration mode.



## Note

Effective with Cisco IOS XR Release 3.8.0, this command is replaced by the **aps group force** command. See the [aps group, on page 915](#) command for more information.

**force** {0| 1}

## Syntax Description

|              |                                                                                                                                                                           |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0   1</b> | initiate a forced automatic protection switching (APS) request at the local end of the SONET link<br><br>Assigned channel number. <b>0</b> = protect, <b>1</b> = working. |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                               |
|---------------|------------------------------------------------------------|
| Release 2.0   | This command was introduced.                               |
| Release 3.8.0 | This command was replaced by the <b>aps group</b> command. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



## Note

If a request of equal or higher priority is in effect, you cannot use the **force** command to initiate a forced APS request at the local end of the SONET link.

Use the **force** command to manually switch the traffic to a protect channel. For example, if you need to change the fiber connection, you can manually force the working channel to switch to the protect interface.

The **0** or **1** keyword (by default 1) identifies on which channel the traffic should be stopped and moved on the protect channel. The **force 1 command** moves traffic from the working channel to the protect channel; the **force 0 command** moves traffic from the protect channel back to the working channel.

A forced switch can be used to override an automatic (Signal Failed Signal Degraded) or a manual switch request. A lockout request (via the **lockout** command) overrides a force request.

In a multirouter APS topology, a force request is allowed only on the protect router.

This command remains in effect until it is unconfigured by using the **no** form of the command.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to move traffic from the working channel back to the protect channel:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# force 1
```

### Related Commands

| Command                              | Description                                                                                                                       |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">lockout, on page 946</a> | Overrides a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic. |
| <a href="#">manual, on page 950</a>  | Initiates a manual APS request at the local end of the SONET link.                                                                |

## framing (SONET)

To specify the framing used on the SONET controller, use the **framing** command in SONET/SDH configuration mode. To disable framing on the SONET controller, use the **no** form of this command.

**framing** {sdh|sonet}

**no framing** {sdh|sonet}

### Syntax Description

|              |                                                                                                     |
|--------------|-----------------------------------------------------------------------------------------------------|
| <b>sdh</b>   | Selects Synchronous Digital Hierarchy (SDH) framing. This framing mode is typically used in Europe. |
| <b>sonet</b> | Selects SONET framing. This is the default.                                                         |

### Command Default

The default framing on SONET controllers is **sonet**.

### Command Modes

SONET/SDH configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **framing** command to select either SONET or SDH framing on the selected physical port, if supported. For physical ports that do not support either of these two options, the **framing** command is disabled.

Use the **no** form of this command to disable SONET or SDH framing on the SONET controller.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

In the following example, the SONET controller is configured for SDH framing:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# framing sdh
```



In the following example, the SONET controller is configured for SONET framing:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# framing sonet
```

#### Related Commands

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 983</a> | Displays information about the operational status of SONET layers. |

# line delay clear

To configure the amount of time before a SONET/SDH line delay trigger alarm is cleared, use the **line delay clear** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

**line delay clear** *value*

**no line delay clear**

## Syntax Description

|              |                                                                                                                                 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------|
| <i>value</i> | Value, in milliseconds, before a SONET/SDH line delay trigger alarm is cleared. The range is 1000 to 180000. The default is 10. |
|--------------|---------------------------------------------------------------------------------------------------------------------------------|

## Command Default

The default is 10.

## Command Modes

SONET controller configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If the timer for the SONET/SDH line delay clear expires, an alarm is cleared.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to specify that SONET/SDH line delay trigger alarms should be cleared after 4000 milliseconds:

```
RP/0/RP0/CPU0:router(config)# controller SONET 0/0/0/2
RP/0/RP0/CPU0:router(config-sonet)# line delay clear 4000
```

**Related Commands**

| Command                                          | Description                                                   |
|--------------------------------------------------|---------------------------------------------------------------|
| <a href="#">line delay trigger</a> , on page 944 | Configures a time value for the SONET/SDH line delay trigger. |

# line delay trigger

To configure a time value for the SONET/SDH line delay trigger, use the **line delay trigger** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

**line delay trigger** *value*

**no line delay trigger**

## Syntax Description

|              |                                                                                        |
|--------------|----------------------------------------------------------------------------------------|
| <i>value</i> | Value, in milliseconds, for the SONET/SDH line delay trigger. The range is 0 to 60000. |
|--------------|----------------------------------------------------------------------------------------|

## Command Default

The default is 0, which means that there is no delay.

## Command Modes

SONET controller configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If the timer for the SONET/SDH line delay trigger expires, an alarm is raised.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to set the SONET/SDH line delay trigger to 3000 milliseconds:

```
RP/0/RP0/CPU0:router(config)# controller SONET 0/0/0/2
RP/0/RP0/CPU0:router(config-sonet)# line delay trigger 3000
```

**Related Commands**

| Command                                       | Description                                                                           |
|-----------------------------------------------|---------------------------------------------------------------------------------------|
| <a href="#">line delay clear, on page 942</a> | Configures the amount of time before a SONET/SDH line delay trigger alarm is cleared. |

# lockout

To override a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic, use the **lockout** command in APS group configuration mode. To remove the lockout, use the **no** form of this command.

**lockout** [0]

**no lockout** [0]

## Syntax Description

|     |                                                                                                                |
|-----|----------------------------------------------------------------------------------------------------------------|
| [0] | (Optional) Specifies blocking of the protect channel from a manual or forced APS request. This is the default. |
|-----|----------------------------------------------------------------------------------------------------------------|

## Command Default

The default is 0.

## Command Modes

APS group configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

A lockout switch request can be used to override a force, an automatic (Signal Failed or Signal Degraded), or a manual switch request. No other request can override a lockout request; it has the highest possible priority.

In a multirouter APS topology, a **lockout** request is allowed only on the protect router.

This command remains in effect until it is unconfigured by using the **no** form of the command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to lock out or prevent the channel from switching to a protect router in the event that the working channel becomes unavailable:

```
RP/0/RP0/CPU0:router(config)# aps group 1
```

```
RP/0/RP0/CPU0:router(config-aps)# lockout 0
```

**Related Commands**

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">aps group, on page 915</a>          | Manually switches an APS channel.                                                          |

# loopback (SONET)

To configure the SONET controller for loopback mode, use the **loopback** command in SONET/SDH configuration mode. To remove the loopback SONET command from the configuration file, use the **no** form of this command.

**loopback** {internal| line}

**no loopback** {internal| line}

## Syntax Description

|                 |                                                                                  |
|-----------------|----------------------------------------------------------------------------------|
| <b>internal</b> | Specifies that all the packets be looped back from the source.                   |
| <b>line</b>     | Specifies that the incoming network packets be looped back to the SONET network. |

## Command Default

This command is disabled by default.

## Command Modes

SONET/SDH configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The SONET and Synchronous Digital Hierarchy (SDH) transport layers support two loopback operation modes for diagnostic purposes: internal and line. In the terminal (internal) loopback, the sent signal is looped back to the receiver. In the facility (line) loopback, the signal received from the far end is looped back and sent on the line. The two loopback modes cannot be active at the same time. In normal operation mode, neither of the two loopback modes is enabled.

## Examples

In the following example, all packets are looped back to the SONET controller:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# loopback internal
```



**Related Commands**

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 983</a> | Displays information about the operational status of SONET layers. |

# manual

**manual** *channel-number* {0| 1}

**no manual** *channel-number* {0| 1}

## Command Default

## Command Modes

## Command History

|               |                                                            |
|---------------|------------------------------------------------------------|
| Release 2.0   | This command was introduced.                               |
| Release 3.8.0 | This command was replaced by the <b>aps group</b> command. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **manual** command to manually switch the circuit to a protect channel. For example, you can use this feature when you need to perform maintenance on the working channel. If a protection switch is already up, you can also use the **manual** command to revert the communication link to the working channel before the wait to restore (WTR) time period has expired. The WTR time period is set by the **revert** command. Use the **no** form of this command to cancel the switch.

A manual switch request can be used to control which channel carries the traffic when no other higher-priority user-initiated or automatic requests are in effect.

The **0** or **1** keyword identifies the channel from which the traffic should be moved on the protect channel:

- The **manual 1** command moves traffic on to the protect channel.
- The **manual 0** command moves traffic on to the working channel.

The manual request has the lowest priority among all user-initiated or automatic requests. Any other such requests override a manual request.

In a multirouter APS topology a **manual** request is allowed only on the protect router.

This command remains in effect until it is unconfigured by using the **no** form of the command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to move traffic on to the protect router:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# manual 1
```

## Related Commands

| Command                              | Description                                                                                                                       |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">force, on page 938</a>   | Initiates a forced APS request at the local end of the SONET link.                                                                |
| <a href="#">lockout, on page 946</a> | Overrides a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic. |

## overhead (SONET)

To set the SONET overhead bytes in the frame header to a specific standards requirement, or to ensure interoperability with equipment from another vendor, use the **overhead** command in SONET/SDH configuration mode. To remove the setting of the SONET overhead bytes from the configuration file and restore the default condition, use the **no** form of this command.

**overhead** {**j0**| **s1s0**} *byte-value*

**no overhead** {**j0**| **s1s0**} *byte-value*

### Syntax Description

|                   |                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>j0</b>         | Sets the J0/C1 byte value in the SONET section overhead. For interoperability with Synchronous Digital Hierarchy (SDH) equipment in Japan, use the value 0x1. Default is 0xcc.                                                                                                                                                                                                           |
| <b>s1s0</b>       | <p>Sets the SS bits value of the H1 byte in the SONET line overhead.</p> <p>Use the following values to tell the SONET transmission equipment the S1 and S0 bit:</p> <ul style="list-style-type: none"> <li>For SONET mode, use <b>0</b> (this is the default).</li> <li>For SDH mode, use <b>2</b>.</li> </ul> <p>Range is from 0 to 3. Default is 0. Values 1 and 3 are undefined.</p> |
| <b>byte-value</b> | Byte value to which the <b>j1</b> or <b>s1s0</b> keyword should be set. Range is from 0 to 255.                                                                                                                                                                                                                                                                                          |

### Command Default

*byte-value*: 0x01 (j0)

*byte-value*: 0 (s1s0)

### Command Modes

SONET/SDH configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **overhead** command to set the SONET overhead bytes in the frame header to a specific standards requirement.

Use the **no** form of this command to remove the setting of the SONET overhead bytes from the configuration file and restore the default condition.

For the **j0** keyword, the value that you use for the trace byte depends on the type of equipment being used. For the **s1s0** keyword, the value that you use depends on whether you are using the SONET or SDH mode. For SONET mode, use the value 0 (the default). For SDH mode, use the value 2.

#### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

#### Examples

The following example shows how to set the SS bits value of the H1 byte in the SONET line overhead to 2 for SDH:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RP0/CPU0:router(config-sonet)# overhead s1s0 2
```

The following example shows how to set the SS bits value of the H1 byte in the SONET line overhead to 0 for SONET:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RP0/CPU0:router(config-sonet)# overhead s1s0 0
```

## overhead (SONET path)

To set the SONET path overhead bytes in the frame header to a specific standards requirement or to ensure interoperability with equipment from another vendor, use the **overhead** command in SONET/SDH path configuration mode. To remove the setting of the SONET path overhead bytes from the configuration file and restore the system to its default condition, use the **no** form of this command.

**overhead** {**c2** *byte-value*| **expected-trace** *LINEascii-text*| **j1** *ascii-value*}

**no overhead** {**c2** *byte-value*| **expected-trace** *LINEascii-text*| **j1** *ascii-value*}

### Syntax Description

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>c2</b> <i>byte-value</i>                     | Specifies Synchronous Transport Signal (STS) synchronous payload envelope (SPE) content (C2) byte. The transmitted <b>c2</b> value is automatically set to 0xCF for unscrambled payload and 0x16 for scrambled payload. If <b>c2</b> is configured to a user-specified value, the user-specified value is always applied regardless of scrambling.<br><br>Replace the <i>byte-value</i> argument with the byte value to which the <b>c2</b> keyword should be set. Range is from 0 to 255. Default value is 0.                                                                                                  |
| <b>j1</b> <i>ascii-value</i>                    | Configures the SONET path trace (j1) buffer.<br><br>Replace the <i>ascii-value</i> argument with a text string that describes the SONET path trace buffer. Default is a 64-byte path trace ASCII message, which includes default information such as router name, (Layer 2 —POS ) interface name, and IP address, if applicable.                                                                                                                                                                                                                                                                                |
| <b>expected-trace</b><br><i>LINE ascii-text</i> | Configures the SONET/SDH path trace. The trace monitoring feature allows a node to perform trace monitoring by using the SONET/SDH capabilities.<br><br>Replace the <i>LINE</i> with the expected trace message<br><br>Replace the <i>ascii-text</i> argument with a text string that describes the SONET path trace buffer. Default is a 64-byte path trace ASCII message, which includes default information such as router name, (Layer 2 —POS ) interface name, and IP address, if applicable.<br><br>the <i>LINE</i> is the expected trace message which should match else ptim mismatch would be reported |

### Command Default

*byte-value*: 0xCF

*byte-value*: 0

### Command Modes

SONET/SDH path configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The SONET standards permit or require user access for configuration of some bytes or bits in the SONET path overhead. Use the **overhead** command to set the SONET path overhead bytes in the frame header to a specific standards requirement. Use the **no** form of this command to remove the setting of the SONET path overhead bytes from the configuration file and restore the system to its default condition.

Use the **c2** keyword to configure the desired C2 byte value in the SONET path overhead.

Use the **j1** keyword to configure a user-defined path trace message in the j1 bytes of the SONET path overhead. For the **j1** keyword, use the default message or insert your own message that has a maximum of 62 characters. If no user-defined message is configured, a default message is automatically generated, containing the router name, the controller name, its IP address, and the values of the sent and received K1 and K2 bytes in the SONET line overhead.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to set the STS SPE C2 byte in the SONET path frame header:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# path
RP/0/RP0/CPU0:router(config-sonet-path)# overhead c2 0x13
```

### Related Commands

| Command                                                      | Description                                  |
|--------------------------------------------------------------|----------------------------------------------|
| <a href="#">scrambling disable (SONET path), on page 968</a> | Disables payload scrambling on a SONET path. |

## path delay clear

To configure the amount of time before a SONET/SDH path delay trigger alarm is cleared, use the **path delay clear** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

**path delay clear** *value*

**no path delay clear**

### Syntax Description

|              |                                                                                                                                         |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>value</i> | Value, in milliseconds, before a SONET/SDH path delay trigger alarm is cleared. The range is 1000 to 180000. The default is 10 seconds. |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

The default is 10 seconds.

### Command Modes

SONET controller configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to specify that SONET/SDH path delay trigger alarms should be cleared after 7000 milliseconds:

```
RP/0/RP0/CPU0:router(config)# controller SONET 0/0/0/1
RP/0/RP0/CPU0:router(config-sonet)# path delay clear 7000
```



**Related Commands**

| Command                                          | Description                                                   |
|--------------------------------------------------|---------------------------------------------------------------|
| <a href="#">path delay trigger</a> , on page 958 | Configures a time value for the SONET/SDH path delay trigger. |

# path delay trigger

To configure a time value for the SONET/SDH path delay trigger, use the **path delay trigger** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

**path delay trigger** *value*

**no path delay trigger**

## Syntax Description

|              |                                                                                        |
|--------------|----------------------------------------------------------------------------------------|
| <i>value</i> | Value, in milliseconds, for the SONET/SDH path delay trigger. The range is 0 to 60000. |
|--------------|----------------------------------------------------------------------------------------|

## Command Default

The default is 0, which means that there is no delay.

## Command Modes

SONET controller configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If the timer for the SONET/SDH path delay trigger expires, an alarm is declared.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to set the SONET/SDH path delay trigger to 6000 milliseconds:

```
RP/0/RP0/CPU0:router(config)# controller SONET 0/0/0/1
RP/0/RP0/CPU0:router(config-sonet)# path delay trigger 6000
```

**Related Commands**

| Command                                        | Description                                                                           |
|------------------------------------------------|---------------------------------------------------------------------------------------|
| <a href="#">path delay clear</a> , on page 956 | Configures the amount of time before a SONET/SDH path delay trigger alarm is cleared. |

## path (SONET)

To enter SONET/SDH path configuration mode, use the **path** command in SONET controller configuration mode.

**path**

### Syntax Description

This command has no keywords or arguments.

### Command Default

No default behavior or values

### Command Modes

SONET controller configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to access SONET path submode from SONET controller configuration mode:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RP0/CPU0:router(config-sonet)# path
```

### Related Commands

| Command                                            | Description                                                                                                                  |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">ais-shut (SONET path), on page 913</a> | Enables automatic insertion of PAIS in the sent SONET signal whenever the SONET path enters the administratively down state. |
| <a href="#">b3-ber-prdi, on page 922</a>           | Enables sending of a PRDI when the BER bit interleaved parity (BIP) B3 threshold is exceeded.                                |

| Command                                                      | Description                                                                                                                                                  |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">delay clear, on page 933</a>                     | Configures the amount of time before a STS path delay trigger alarm is cleared.                                                                              |
| <a href="#">delay trigger, on page 935</a>                   | Configures a time value for the STS path delay trigger.                                                                                                      |
| <a href="#">overhead (SONET path), on page 954</a>           | Sets the SONET path overhead bytes in the frame header to a specific standards requirement or to ensure interoperability with equipment from another vendor. |
| <a href="#">report (SONET path), on page 964</a>             | Configures whether or not selected SONET alarms are logged to the console for a SONET path controller.                                                       |
| <a href="#">scrambling disable (SONET path), on page 968</a> | Disables payload scrambling on a SONET path.                                                                                                                 |
| <a href="#">threshold (SONET path), on page 999</a>          | Sets the bit error rate (BER) threshold values of the specified alarms for a SONET path.                                                                     |
| <a href="#">uneq-shut (SONET path), on page 1001</a>         | Enables automatic insertion of P-UNEQ code (0x00) in the sent SONET path overhead C2 byte.                                                                   |

# report (SONET)

To permit selected SONET alarms to be logged to the console for a SONET controller, use the **report** command in SONET/SDH configuration mode. To disable logging of select SONET alarms, use the **no** form of this command.

**report** [b1-tca| b2-tca| lais| lrdi| sd-ber| sf-ber| slof| slos]

**no report** [b1-tca| b2-tca| lais| lrdi| sd-ber| sf-ber| slof| slos]

## Syntax Description

|               |                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|
| <b>b1-tca</b> | (Optional) Reports bit 1 (B1) bit error rate (BER) threshold crossing alert (TCA) errors. |
| <b>b2-tca</b> | (Optional) Reports bit 2 (B2) BER TCA errors.                                             |
| <b>lais</b>   | (Optional) Reports line alarm indication signal (LAIS) errors.                            |
| <b>lrdi</b>   | (Optional) Reports line remote defect indication errors.                                  |
| <b>sd-ber</b> | (Optional) Reports signal degradation BER errors.                                         |
| <b>sf-ber</b> | (Optional) Reports signal failure BER errors.                                             |
| <b>slof</b>   | (Optional) Reports section loss of frame (SLOF) errors.                                   |
| <b>slos</b>   | (Optional) Reports section loss of signal (SLOS) errors.                                  |

## Command Default

Alarms from the following keywords are reported by default:

- b1-tca
- b2-tca
- sf-ber
- slof
- slos

## Command Modes

SONET/SDH configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Reporting an alarm means that the alarm can be logged to the console, but it is no guarantee that it is logged. SONET alarm hierarchy rules dictate that only the most severe alarm of an alarm group is reported. Whether an alarm is reported or not, you can check the current state of masked alarm, a problem indication that is a candidate for an alarm, by displaying the “Masked Alarms” line in the **show controllers sonet** command output.

For B1, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B1 byte of the following frame. Differences indicate that section-level bit errors have occurred.

For B2, the BIP error report is calculated by comparing the BIP-8/24 code with the BIP-8 code that is extracted from the B2 byte of the following frame. Differences indicate that line-level bit errors have occurred.

Path AIS is sent by line terminating equipment to alert the downstream path terminating equipment (PTE) that it has detected a defect on its incoming line signal.

Path loss of pointer (LOP) is reported as a result of an invalid pointer (H1, H2) or an excess number of new data flag enabled indications.

SLOF is detected when an error-framing defect on the incoming SONET signal persists for 3 microseconds.

SLOS is detected when an all-zeros pattern on the incoming SONET signal is observed. This defect might also be reported if the received signal level drops below the specified threshold.

To determine the alarms that are reported on the controller, use the **show controllers sonet** command.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to enable the reporting of line AIS alarms on the path controller:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RP0/CPU0:router(config-sonet)# report lais
```

**Related Commands**

| Command                                              | Description                                                        |
|------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , on page 983 | Displays information about the operational status of SONET layers. |

# report (SONET path)

To configure whether or not selected SONET alarms are logged to the console for a SONET path controller, use the **report** command in SONET/SDH path configuration mode. To disable or re-enable the logging of select SONET alarms, use the **no** form of this command.

**report** [b3-tca| pais| plop| pplm| prdi| ptim]

**no report** [b3-tca| pais| plop| pplm| prdi| ptim]

## Syntax Description

|               |                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|
| <b>b3-tca</b> | (Optional) Reports bit 3 (B3) bit error rate (BER) threshold crossing alert (TCA) errors. |
| <b>pais</b>   | (Optional) Reports path alarm indication signal (PAIS) errors.                            |
| <b>plop</b>   | (Optional) Reports path loss of pointer (PLOP) errors.                                    |
| <b>pplm</b>   | (Optional) Reports path payload mismatch (PPLM) defect errors.                            |
| <b>prdi</b>   | (Optional) Reports path remote defect indication (PRDI) errors.                           |
| <b>ptim</b>   | (Optional) Reports path trace identity mismatch (PTIM) defect errors.                     |

## Command Default

Alarms from the following keywords are reported:

- b3-tca
- plop

## Command Modes

SONET/SDH path configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Reporting an alarm means that the alarm can be logged to the console, but it is no guarantee that it is logged. SONET alarm hierarchy rules dictate that only the most severe alarm of an alarm group is reported. Whether an alarm is reported or not, you can view the current state of a masked alarm, a problem indication that is a



candidate for an alarm, by inspecting the “Masked Alarms” line displayed in the **show controllers sonet** command output.

For B3, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B3 byte of the following frame. Differences indicate that path-level bit errors have occurred.

Path AIS is sent by line-terminating equipment to alert the downstream path-terminating equipment (PTE) that it has detected a defect on its incoming line signal.

Path LOP is reported as a result of an invalid pointer (H1, H2) or an excess number of new data flag enabled indications.

To determine the alarms that are reported on the controller, use the **show controllers sonet** command.

All report commands accept the default option. The default reporting values are determined based upon the SONET standards specifications and are clearly identified in the corresponding command’s help string.

**Note**

The reporting of B3 BER TCA errors and path LOP errors is enabled by default.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

In the following example, reporting of path PAIS alarms is enabled:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# path
RP/0/RP0/CPU0:router(config-sonet-path)# report pais
```

**Related Commands**

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers. |

# revert

To enable automatic switchover from the protect interface to the working interface after the working interface becomes available, use the **revert** command in APS configuration mode. To disable automatic switchover, use the **no** form of this command.

**revert** *minutes*

**no revert** *minutes*

## Syntax Description

|                |                                                                                                                         |
|----------------|-------------------------------------------------------------------------------------------------------------------------|
| <i>minutes</i> | Number of minutes until the circuit is switched back to the working interface after the working interface is available. |
|----------------|-------------------------------------------------------------------------------------------------------------------------|

## Command Default

*minutes*: 0

Automatic switchover is disabled.

## Command Modes

APS group configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **revert** command to enable and disable revertive APS operation mode, if needed. The revertive APS operation mode of the routers should be matched with the APS operation mode of the connected SONET equipment. Use the **no** form of this command to disable automatic switchover.

The revertive APS operation mode is the recommended operation mode because it offers better traffic protection during various possible software failures and upgrade or downgrade scenarios.

The *minutes* argument indicates how many minutes will elapse until automatic protection switching (APS) decides to switch traffic back from protect to working after the condition that caused an automatic (Signal Failed or Signal Degrade) switch to protect disappears. A value of 0 (default) disables APS revertive mode.

In a multirouter APS topology, the **revert** command is allowed only on the protect router.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to enable APS to revert to the protect or working channel after 5 minutes have elapsed:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# revert 5
```

## Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps, on page 970</a>           | Displays the operational status for all configured SONET APS groups.                       |

## scrambling disable (SONET path)

To disable payload scrambling on a SONET path, use the **scrambling disable** command in SONET/SDH path configuration mode. To enable payload scrambling after it has been disabled, use the **no** form of this command.

**scrambling disable**

**no scrambling disable**

**Syntax Description** This command has no keywords or arguments.

**Command Default** The default is enable (SONET payload scrambling is on).

**Command Modes** SONET/SDH path configuration

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | Release 2.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

SONET payload scrambling applies a self-synchronous scrambler (x43+1) to the synchronous payload envelope (SPE) of the controller to ensure sufficient bit transition density. Both ends of the connection must be configured using SONET path scrambling.

If the hardware payload scrambling support is not user-configurable, or is not supported, the **scrambling disable** command may be rejected.

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

**Examples** In the following example, scrambling is disabled for the path:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# path
RP/0/RP0/CPU0:router(config-sonet-path)# scrambling disable
```

**Related Commands**

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 983</a> | Displays information about the operational status of SONET layers. |

# show aps

To display the operational status for all configured SONET automatic protection switching (APS) groups, use the **show aps** command in EXEC mode.

**show aps**

## Syntax Description

This command has no keywords or arguments.

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show aps** command to display operational status for all configured SONET APS groups.

Displaying the SONET APS operational data is considered of lower priority than the APS operation itself. Because the information is collected from several sources scattered across the various nodes involved, there is a small probability that some states will change while the command is being run.

The command should be reissued for confirmation before decisions are made based on the results displayed.

## Task ID

| Task ID   | Operations |
|-----------|------------|
| sonet-sdh | read       |

## Examples

The following is sample output from the **show aps** command:

```
RP/0/RP0/CPU0:router# show aps

APS Group 1:
Protect ch 0 (SONET3_0):Enabled
 SONET framing, SONET signalling, bidirectional, revertive (300 sec)
 Rx K1:0x21 (Reverse Request - Working)
 K2:0x15 (bridging Working, 1+1, bidirectional)
 Tx K1:0x81 (Manual Switch - Working)
 K2:0x15 (bridging Working, 1+1, bidirectional)
```

```

Working ch 1 (SONET2_0):Disabled
Rx K1:0x00 (No Request - Null)
K2:0x00 (bridging Null, 1+1, non-aps)
Tx K1:0x00 (No Request - Null)
K2:0x00 (bridging Null, 1+1, non-aps)
APS Group 3:
PGP:protocol version: native 2 adopted 2
PGP:Authentication "cisco", hello timeout 1 sec, hold timeout 3 sec
Protect ch 0 (SONET3_1):Disabled
SONET framing, SONET signalling, bidirectional, non-revertive
Rx K1:0x00 (No Request - Null)
K2:0x05 (bridging Null, 1+1, bidirectional)
Tx K1:0x00 (No Request - Null)
K2:0x05 (bridging Null, 1+1, bidirectional)
Working ch 1 (192.168.1.1):Enabled
APS Group 49:
Protect ch 0 (SONET0_2_0_0):Disabled
SONET framing, SONET signalling, unidirectional, non-revertive
Rx K1:0x00 (No Request - Null)
K2:0x00 (bridging Null, 1+1, non-aps)
Tx K1:0x00 (No Request - Null)
K2:0x04 (bridging Null, 1+1, unidirectional)
Working ch 1 (SONET0_2_0_1):Enabled
SONET framing, unidirectional
Rx K1:0x00 (No Request - Null)
K2:0x00 (bridging Null, 1+1, non-aps)
Tx K1:0x00 (No Request - Null)
K2:0x00 (bridging Null, 1+1, non-aps)
APS Group 6:
PGP:protocol version: native 2 adopted 2
PGP:Authentication "cisco", hello timeout 1 sec, hold timeout 3 sec
Protect ch 0 (192.168.3.2 - auto):Disabled
Working ch 1 (SONET6_0):Enabled
Rx K1:0x00 (No Request - Null)
K2:0x00 (bridging Null, 1+1, non-aps)
Tx K1:0x00 (No Request - Null)
K2:0x00 (bridging Null, 1+1, non-aps)

```

**Table 84: show aps Field Descriptions**

| Field      | Description                                                    |
|------------|----------------------------------------------------------------|
| APS Group  | Assigned number of the APS group. Range is from 1 through 255. |
| Protect ch | Number and address of the protect channel interface.           |
| Working ch | Number and address of the working channel interface.           |

**Related Commands**

| Command                                       | Description                                                            |
|-----------------------------------------------|------------------------------------------------------------------------|
| <a href="#">show aps agents</a> , on page 972 | Displays the status of the APS WP distributed communication subsystem. |
| <a href="#">show aps group</a> , on page 974  | Displays information about the APS groups.                             |

# show aps agents

To display the status of the automatic protection switching (APS) working to protect (WP) distributed communication subsystem, use the **show aps agents** command in EXEC mode.

## show aps agents

### Syntax Description

This command has no keywords or arguments.

### Command Default

No default behavior or values

### Command Modes

EXEC

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show aps agents** command to display the status of the APS WP distributed communication subsystem.

The WP communication is critical for the APS functionality. The **show aps agents** command is typically used as a debugging aid for unexpected or unusual APS operation.

Displaying the APS operational data is considered of lower priority than the APS operation itself. Because the information is collected from several sources scattered across the various nodes involved, there is a small probability that some states will change while the command is being run.

The command should be reissued for confirmation before decisions are made based on the results displayed.

### Task ID

| Task ID   | Operations |
|-----------|------------|
| sonet-sdh | read       |

### Examples

The following is sample output from the **show aps agents** command:

```
RP/0/RP0/CPU0:router# show aps agents

SONET APS Manager working-Protect (WP) connections:
Remote peer (192.168.3.2 - auto) is up:
 Group 6 [P.Ch0] 192.168.3.2 == Manager --- SONET6_0 (node6) --- [W.Ch1]
Remote peer (10.1.1.1) is up:
```



```

Group 3 [W.Ch1] 192.168.1.1 === Manager --- SONET3_1 (node3) --- [P.Ch0]
Local agent (node2) is up:
Group 1 [W.Ch1] --- SONET2_0 --- SONET3_0 (node3) --- [P.Ch0]
Local agent (node3) is up:
Group 1 [P.Ch0] --- SONET3_0 --- SONET2_0 (node2) --- [W.Ch1]
Group 3 [P.Ch0] --- SONET3_1 --- Manager === 192.168.1.1 [W.Ch1]
Group 5 [P.Ch0] --- SONET3_2 --- SONET3_3 (node3) --- [W.Ch1]
Group 5 [W.Ch1] --- SONET3_3 --- SONET3_2 (node3) --- [P.Ch0]
Local agent (node6) is up:
Group 6 [W.Ch1] --- SONET6_0 --- Manager === 192.168.3.2 [P.Ch0]

```

**Table 85: show aps agents Field Descriptions**

| Field       | Description                                                                                                                                                                                                                                                                                |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Remote peer | IP address of the remote Protect Group Protocol (PGP) peer for the working router in an APS group. An IP address of 0.0.0.0 indicates a dynamically discovered PGP peer not yet contacted, shown on working routers only. (The protect router contacts the working router.)                |
| Local agent | Node name of the local agent, such as (node2).                                                                                                                                                                                                                                             |
| Group       | The interface location or IP address of the SONET APS group.<br><br>Internal WP communication channel segments are represented as “---” if the segment is operational or “-/-” if the connection is broken.<br><br>PGP segments are represented as “===” if operational or “==” if broken. |

**Related Commands**

| Command                                                | Description                                                          |
|--------------------------------------------------------|----------------------------------------------------------------------|
| <a href="#">show aps</a> , <a href="#">on page 970</a> | Displays the operational status for all configured SONET APS groups. |

# show aps group

To display information about the automatic protection switching (APS) groups, use the **show aps group** command in EXEC mode.

**show aps group** [ *number* ]

## Syntax Description

|               |                                       |
|---------------|---------------------------------------|
| <i>number</i> | (Optional) The assigned group number. |
|---------------|---------------------------------------|

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **show aps group** command displays information about APS groups, and is useful if multiple APS groups are configured.

Displaying the APS operational data is considered of lower priority than the APS operation itself. Because the information is collected from several sources scattered across the various nodes involved, there is a small probability that some states will change while the command is being run.

The command should be reissued for confirmation before decisions are made based on the results displayed.

## Task ID

| Task ID   | Operations |
|-----------|------------|
| sonet-sdh | read       |

## Examples

The following is sample output from the **show aps group** command:

```
RP/0/RP0/CPU0:router# show aps group 3

APS Group 3:
 PGP:Authentication "cisco", hello timeout 1 sec, hold timeout 3 sec
 Protect ch 0 (SONET3_1):Admin Down, Disabled
```

```

SONET framing, SONET signalling, bidirectional, non-revertive
Rx K1:0x00 (No Request - Null)
 K2:0x05 (bridging Null, 1+1, bidirectional)
Tx K1:0x00 (No Request - Null)
 K2:0x05 (bridging Null, 1+1, bidirectional)
Working ch 1 (192.168.1.1):Admin Down, Enabled

```

**Table 86: show aps group Field Descriptions**

| Field      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| APS Group  | <p>Group number assigned to the displayed APS group. For each channel in the group, the following information is displayed:</p> <ul style="list-style-type: none"> <li>• Authentication string</li> <li>• Hello timer value</li> <li>• Hold timer value</li> <li>• Role of the channel (working or protect)</li> <li>• Channel number</li> <li>• Name of the assigned physical port</li> <li>• Channel status (Enabled, Disabled, Admin Down, Signal Fail, Signal Degraded, or Not Contacted)</li> <li>• Group-related information (for protect channels only) that includes: <ul style="list-style-type: none"> <li>◦ Framing of the SONET port</li> <li>◦ Kilobytes signaling protocol</li> <li>◦ Unidirectional or bidirectional APS mode</li> <li>◦ APS revert time, in seconds (in revertive operation mode only)</li> </ul> </li> </ul> |
| Rx         | Received error signaling bytes and their APS decoded information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Tx         | Sent error signaling bytes and their APS decoded information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Working ch | IP address of the corresponding Protect Group Protocol (PGP) peer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

The information displayed for the channels local to the routers is identical to the channel information displayed for single-router APS groups.

**Related Commands**

| Command                                      | Description                                                            |
|----------------------------------------------|------------------------------------------------------------------------|
| <a href="#">show aps, on page 970</a>        | Displays the operational status for all configured SONET APS groups.   |
| <a href="#">show aps agents, on page 972</a> | Displays the status of the APS WP distributed communication subsystem. |

# show controllers pos

To display information on the Packet-over-SONET/SDH (POS) controllers, use the **show controllers pos** command in EXEC mode.

**show controllers pos** *interface-path-id* [**all** | **framer** {**internal** | **register** | **statistics**} | **internal**] [**begin line** | **exclude line** | **file filename** | **include line**]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>all</b>               | (Optional) Displays information for all POS interface controllers.                                                                                                                                                                                                              |
| <b>framer</b>            | (Optional) Displays all POS framer information.                                                                                                                                                                                                                                 |
| <b>internal</b>          | (Optional) Displays all POS internal information.                                                                                                                                                                                                                               |
| <b>register</b>          | (Optional) Displays the POS framer registers.                                                                                                                                                                                                                                   |
| <b>statistics</b>        | (Optional) Displays the POS framer cumulative counters.                                                                                                                                                                                                                         |
| <b>begin line</b>        | (Optional) Displays information beginning with the line that includes the regular expression given by the <i>line</i> argument.                                                                                                                                                 |
| <b>exclude line</b>      | (Optional) Displays information excluding all lines that contain regular expressions that match the <i>line</i> argument.                                                                                                                                                       |
| <b>file filename</b>     | (Optional) Saves the configuration to the designated file. For more information on which standard filenames are recognized, use the question mark (?) online help function.                                                                                                     |
| <b>include line</b>      | (Optional) Displays only those lines that contain the regular expression given by the <i>line</i> argument.                                                                                                                                                                     |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

**Examples**

The following is sample output from the **show controllers pos** command:

```
RP/0/RP0/CPU0:router# show controllers POS 0/3/0/2
```

```
Port Number : 2
Interface : POS0/3/0/2
Ifhandle : 0x1380120
CRC : 32
MTU : 4474
Port Bandwidth Kbps : 2488320
Admin state : Up
Driver Link state : Up
```

```
Bundle member : No
Bundle MTU : 4474
Bundle Adminstate : Up
```

The following is sample output from the **show controllers pos all** command:

```
RP/0/RP0/CPU0:router# show controllers POS 0/3/0/2 all
```

```
Port Number : 2
Interface : POS0/3/0/2
Ifhandle : 0x1380120
CRC : 32
MTU : 4474
Port Bandwidth Kbps : 2488320
Admin state : Up
```

Driver Link state : Up

Bundle member : No  
 Bundle MTU : 4474  
 Bundle Adminstate : Up

#### POS Driver Internal Cooked Stats Values for port 2

```
=====
Rx Statistics Tx Statistics

Total Bytes: 1200 Total Bytes: 0
Good Bytes: 1200 Good Bytes: 0
Good Packets: 25 Good Packets: 0
Aborts: 0 Aborts: 0
FCS Errors: 0 Min-len errors: 0
Runts: 0 Max-len errors: 0
FIFO Overflows: 0 FIFO Underruns: 0
Giants: 0
Drops: 0
```

#### Sky4402 asic #2 registers:

```
0x000 general_cntrl 0x00
0x002 sys_intf_cntrl_1 0x06
0x003 sys_intf_cntrl_2 0x00
0x004 JTAG3 0x10
0x005 JTAG2 0x10
0x006 JTAG1 0x10
0x007 JTAG0 0x2f
0x010 active_led 0x01
0x011 gpio_port_mode 0x01
0x012 gpio_port_fault 0x00
0x013 gpio_port_data 0x58
0x015 gpio_port_cntrl 0x3f
0x017 gpio_port_transition 0x00
0x019 gpio_port_intr_mask 0xff
0x01b gpio_port_intr 0x3f
0x01c master_intr_status 0x00
0x01d master_mask 0x00
0x020 interrupt_4 0x04
0x021 interrupt_3 0x00
0x022 interrupt_2 0x00
0x023 interrupt_1 0x00
0x024 status_4 0x04
0x025 status_3 0x00
0x026 status_2 0x0c
0x027 status_1 0x80
0x028 mask_4 0x07
0x029 mask_3 0x03
0x02a mask_2 0x1c
0x02b mask_1 0x8f
0x02d link_state_cntrl 0x80
0x041 diag 0x00
0x042 stcks 0x03
0x043 short_frame_cntrl 0x00
0x0c0 ror_ram_c2 0x16
0x0c1 ror_ram_g1 0x00
0x0c2 ror_ram_f2 0x00
0x0c3 ror_ram_h4 0x00
0x0c4 ror_ram_z3 0x00
0x0c5 ror_ram_z4 0x00
0x0c6 ror_ram_z5 0x00
0x0c7 ror_ram_db_c2 0x16
0x0c8 ror_ram_db_g1 0x00
0x142 tor_ram_c2 0x16
0x143 tor_ram_g1 0x00
0x144 tor_ram_f2 0x00
0x145 tor_ram_h4 0x00
```

## show controllers pos

```

0x146 tor_ram_z3 0x00
0x147 tor_ram_z4 0x00
0x148 tor_ram_z5 0x00
0x170 tor_ram_s1 0x00
0x171 tor_ram_e2 0x00
0x172 tor_ram_e1 0x00
0x173 tor_ram_f1 0x00
0x174 tor_ram_k1 0x00
0x175 tor_ram_k2 0x00
0x177 tor_ram_z2 0x00
0x180 rsp_cntrl_1 0x00
0x181 rsp_cntrl_2 0x02
0x184 rtop_f1_ovrhd 0x00
0x185 rtop_k1_ovrhd 0x00
0x186 rtop_k2_ovrhd 0x00
0x187 rtop_s1_ovrhd 0x00
0x188 rtop_e1_ovrhd 0x00
0x189 rtop_e2_ovrhd 0x00
0x18a rtop_deb_s1_ovrhd 0x00
0x18c rtop_b1_mismatch_cnt_u 0x00
0x18d rtop_b1_mismatch_cnt_l 0x00
0x190 rtop_b2_mismatch_cnt_u 0x00
0x191 rtop_b2_mismatch_cnt_l 0x00
0x194 rtop_rei_l_cnt_u 0x00
0x195 rtop_rei_l_cnt_l 0x00
0x198 rtop_ber_thresh_u 0x00
0x199 rtop_ber_thresh_l 0x00
0x19a rtop_ber_leak_u 0x00
0x19b rtop_ber_leak_l 0x00
0x19c rtop_ber_delay_u 0x00
0x19d rtop_ber_delay_l 0x00
0x1c0 rpop_signal_lbl_c2 0x16
0x1c2 rpop_valid_ptr_u 0x02
0x1c3 rpop_valid_ptr_l 0x0a
0x1c4 rpop_b3_mismatch_cnt_u 0x00
0x1c5 rpop_b3_mismatch_cnt_l 0x00
0x1c8 rpop_rei_p_cnt_u 0x00
0x1c9 rpop_rei_p_cnt_l 0x00
0x1cc rpop_ber_thresh_u 0x00
0x1cd rpop_ber_thresh_l 0x00
0x1ce rpop_ber_leak_u 0x00
0x1cf rpop_ber_leak_l 0x00
0x1d0 rpop_ber_delay_u 0x00
0x1d1 rpop_ber_delay_l 0x00
0x200 rpp_cntrl_1 0x11
0x201 rpp_cntrl_2 0x03
0x202 rpp_cntrl_3 0x3e
0x203 rpp_cntrl_4 0x00
0x204 rpp_cntrl_5 0x00
0x208 rpp_max_pkt_len_u 0x08
0x209 rpp_max_pkt_len_l 0xbd
0x20a rpp_min_pkt_len 0x04
0x244 tpp_inter_pkt_u 0x00
0x245 tpp_inter_pkt_l 0x00
0x246 tpp_idle_cell_hdr 0x00
0x247 tpp_idle_cell_filldata 0x00
0x248 tpp_cntrl 0x04
0x280 tpog_cntrl 0x20
0x2c0 ttog_cntrl 0x00
0x2c2 ttog_ovrhd_src_1 0x00
0x2c3 ttog_ovrhd_src_2 0x00
0x2c9 ttog_ovrhd_fill 0x00

```

Table 87: show controllers pos Field Descriptions

| Field                                  | Description                                                           |
|----------------------------------------|-----------------------------------------------------------------------|
| Cisco POS ASIC Register Dump (Receive) | Header for display of the contents of the receive ASIC1 register log. |



| Field                                              | Description                                                                                                        |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| asic mode                                          | Address in hex of the ASIC mode flag.                                                                              |
| error source                                       | Address in hex of the error source flag.                                                                           |
| error mask                                         | Address in hex of the error mask flag.                                                                             |
| error detail 1                                     | Address in hex of the error detail 1 flag.                                                                         |
| error detail 2                                     | Address in hex of the error detail 2 flag.                                                                         |
| rx offset                                          | Address in hex of the receive offset.                                                                              |
| Channel Modes                                      | Location in hex of the channel mode flag.                                                                          |
| Port 0:                                            | Port 0 (the first port) statistics display.                                                                        |
| Port 1:                                            | Port 1 (the second port) statistics display.                                                                       |
| Port 2:                                            | Port 2 (the third port) statistics display.                                                                        |
| Port 3:                                            | Port 3 (the fourth port) statistics display.                                                                       |
| Runt Threshold                                     | Limit in packets set for runs on the specified port.                                                               |
| Tx Delay                                           | Transmit delay that has been set for the specified port.                                                           |
| Cisco POS ASIC Register Dump (Transmit)            | Header for display of the contents of the transmit ASIC register log.                                              |
| POS Driver Internal Cooked Stats Values for port 0 | Statistics relating to the specified POS port (POS port 0).                                                        |
| Rx Statistics                                      | Receive statistics for the indicated POS port.                                                                     |
| Total Bytes                                        | Total number of bytes, including data and MAC encapsulation, received by the system.                               |
| Good Bytes                                         | Number of bytes received without errors.                                                                           |
| Good Packets                                       | Number of packets received without errors.                                                                         |
| Aborts                                             | Number of receive bytes that have been aborted                                                                     |
| FCS Errors                                         | Number of FCS2 errors that have been received.                                                                     |
| Runts                                              | Number of received packets that are discarded because they are smaller than the minimum packet size of the medium. |

| Field          | Description                                                                                                                                                                                                                                          |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FIFO Overflows | Number of received packets that exceeded the FIFO stack limit.                                                                                                                                                                                       |
| Giants         | Number of received packets that are discarded because they exceed the maximum packet size of the medium.                                                                                                                                             |
| Drops          | Number of received packets that have been dropped from the system.                                                                                                                                                                                   |
| Tx Statistics  | Transmit statistics for the indicated POS port.                                                                                                                                                                                                      |
| Total Bytes    | Total number of bytes, including data and MAC encapsulation, sent by the system.                                                                                                                                                                     |
| Good Bytes     | Number of bytes sent without errors.                                                                                                                                                                                                                 |
| Good Packets   | Number of packets sent without errors.                                                                                                                                                                                                               |
| Aborts         | Number of sent bytes that have been aborted.                                                                                                                                                                                                         |
| Min-len errors | Minimum queue length violations.                                                                                                                                                                                                                     |
| Max-len errors | Maximum queue length violations.                                                                                                                                                                                                                     |
| FIFO Underruns | First-in, first-out, a buffering scheme where the first byte of data entering the buffer is the first byte retrieved by the CPU. FIFO underruns reports the number of times that the transmitter has been running faster than the router can handle. |

[1](#) [2](#)

<sup>1</sup> 1. application-specific integrated circuit

<sup>2</sup> 2. frame check sequence

# show controllers sonet

To display information about the operational status of SONET layers, use the **show controllers sonet** command in EXEC mode.

**show controllers sonet** *interface-path-id* {**all**|**framers**|**internal-state**}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>all</b>               | Displays all information.                                                                                                                                                                                                                                                    |
| <b>framers</b>           | Displays framer information.                                                                                                                                                                                                                                                 |
| <b>internal-state</b>    | Displays internal SONET state.                                                                                                                                                                                                                                               |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.

- If specifying a virtual interface, the number range varies, depending on interface type.

Use the **show controllers sonet** command to display information about the operational status of SONET layers on a particular SONET port.

If the manageability PIE is not installed, you can use the **show controllers sonet** command to display the counters for the current 15 minutes only without history data. However, the SONET MIB is still available but is limited to the current bucket of data. History data is still available only when the manageability PIE is loaded. The **show controllers sonet** command is available at any time to display current data, and history data is stored in the line card rather in the history bucket.

Task ID

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

Examples

The following is sample output from the **show controllers sonet** command:

```
RP/0/RP0/CPU0:router# show controllers sonet 0/1/2/1

Port SONET0/1/2/1:

Status: Up

Loopback: None

SECTION
 LOF = 0 LOS = 0 BIP(B1) = 0
LINE
 AIS = 0 RDI = 1 FEBE = 0 BIP(B2) = 0
PATH
 AIS = 0 RDI = 0 FEBE = 0 BIP(B3) = 0
 LOP = 0 NEWPTR = 0 PSE = 0 NSE = 0
 PLM = 0 TIM = 0

Line delays trigger: 0 ms clear: 10000 ms
Path delays trigger: 0 ms clear: 10000 ms
Last clearing of "show controllers SONET" counters never

Detected Alarms: None
Asserted Alarms: None
Mask for Detected->Asserted: None
Detected Alerts: None
Reported Alerts: None
Mask for Detected->Reported: None
Alarm reporting enabled for: SLOS SLOF SF_BER PLOP
Alert reporting enabled for: B1-TCA B2-TCA B3-TCA

Framing: SONET
SPE Scrambling: Enabled
C2 State: Stable C2_rx = 0x16 (22) C2_tx = 0x16 (22) / Scrambling Derived
S1S0(tx): 0x0 S1S0(rx): 0x0 / Framing Derived

PATH TRACE BUFFER : STABLE
 Remote hostname : P1 CRS-8
 Remote interface: POS0/1/4/0
 Remote IP addr : 0.0.0.0

APS
No APS Group Configured
Protect Channel 0 DISABLED
Rx(K1/K2) : 0x00/0x00
Tx(K1/K2) : 0x00/0x00
```

```

Remote Rx(K1/K2): 01/0 Remote Tx(K1/K2): 01/0

BER thresholds: SF = 10e-3 SD = 10e-6
TCA thresholds: B1 = 10e-6 B2 = 10e-6 B3 = 10e-6

Optics type: OC48 SR/STM16 I-16
Clock source: internal (actual) internal (configured)
Rx S1: 0xf Tx S1: 0x50

Optical Power Monitoring (accuracy: +/- 1dB)
Rx power = 0.3162 mW, -5.0 dBm
Tx power = 0.2883 mW, -5.4 dBm
Tx laser current bias = 17.2 mA

```

**Table 88: show controllers sonet Field Descriptions**

| Field    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port     | Slot number of the POS interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Status   | Displays whether the link associated with the specified port is up or down.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Loopback | Loopback identifier, if applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| LOF      | Section loss of frame is detected when a severely error-framing (SEF) defect on the incoming SONET signal persists for 3 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| LOS      | Section loss of signal is detected when an all-zeros pattern on the incoming SONET signal lasts 19(+3) microseconds or longer. This defect might also be reported if the received signal level drops below the specified threshold.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| BIP      | Bit interleaved parity error reported. <ul style="list-style-type: none"> <li>• For B1, the bit interleaved parity error report is calculated by comparing the BIP-8 code with the BIP-8 code extracted from the B1 byte of the following frame. Differences indicate that section-level bit errors have occurred.</li> <li>• For B2, the bit interleaved parity error report is calculated by comparing the BIP-8/24 code with the BIP-8 code extracted from the B2 byte of the following frame. Differences indicate that line-level bit errors have occurred.</li> <li>• For B3, the bit interleaved parity error report is calculated by comparing the BIP-8 code with the BIP-8 code extracted from the B3 byte of the following frame. Differences indicate that path-level bit errors have occurred.</li> </ul> |

| Field  | Description                                                                                                                                                                                                                                                                                                                                                                                |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AIS    | <p>Alarm indication signal.</p> <ul style="list-style-type: none"> <li>Line alarm indication signal is sent by the STE1 to alert the downstream LTE2 that a LOS or LOF defect has been detected on the incoming SONET section.</li> <li>Path alarm indication signal is sent by the LTE to alert the downstream PTE3 that it has detected a defect on its incoming line signal.</li> </ul> |
| RDI    | <p>Remote defect indication.</p> <ul style="list-style-type: none"> <li>Line remote defect indication is reported by the downstream LTE when it detects LOF4, LOS5, or AIS6.</li> <li>Path remote defect indication is reported by the downstream PTE when it detects a defect on the incoming signal.</li> </ul>                                                                          |
| FEBE   | <p>Far-end block errors.</p> <ul style="list-style-type: none"> <li>Line far-end block error (accumulated from the M0 or M1 byte) is reported when the downstream LTE detects BIP7 (B2) errors.</li> <li>Path far-end block error (accumulated from the G1 byte) is reported when the downstream PTE detects BIP (B3) errors.</li> </ul>                                                   |
| LOP    | Path loss of pointer is reported as a result of an invalid pointer (H1, H2) or an excess number of NDF8 enabled indications.                                                                                                                                                                                                                                                               |
| NEWPTR | Inexact count of the number of times the SONET framer has validated a new SONET pointer value (H1, H2).                                                                                                                                                                                                                                                                                    |
| PSE    | Inexact count of the number of times the SONET framer has detected a positive stuff event in the received pointer (H1, H2).                                                                                                                                                                                                                                                                |
| NSE    | Inexact count of the number of times the SONET framer has detected a negative stuff event in the received pointer (H1, H2).                                                                                                                                                                                                                                                                |
| PLM    | Payload label mismatch. A different payload-specific functionality than the provisioned functionality is reported. For example, 02 to E0, or FD to FE.                                                                                                                                                                                                                                     |

| Field                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TIM                                                | Trace identifier mismatch. Reported TIM defects that occur primarily as a result of provisioning errors; for example, incorrect cross-connections in the network.                                                                                                                                                                                                                                            |
| Line delays trigger                                | Line triggers delayed and cleared, in milliseconds.                                                                                                                                                                                                                                                                                                                                                          |
| Path delays trigger                                | Path triggers delayed and cleared, in milliseconds.                                                                                                                                                                                                                                                                                                                                                          |
| Last clearing of “show controllers SONET” counters | When the counters associated with the <b>show controllers sonet</b> command were last cleared.                                                                                                                                                                                                                                                                                                               |
| Detected/Asserted Alarms                           | Any alarms detected by the controller are displayed here. Alarms are as follows: <ul style="list-style-type: none"> <li>• Transmitter is sending remote alarm.</li> <li>• Transmitter is sending AIS.</li> <li>• Receiver has loss of signal.</li> <li>• Receiver is getting AIS.</li> <li>• Receiver has loss of frame.</li> <li>• Receiver has remote alarm.</li> <li>• Receiver has no alarms.</li> </ul> |
| Mask for Detected -> Asserted                      | Masked alarms for the asserted alarm. For example, when SLOS is asserted, all low-level alarms are masked and are listed in this section of the output.                                                                                                                                                                                                                                                      |
| Detected Alerts                                    | List of alerts that are detected.                                                                                                                                                                                                                                                                                                                                                                            |
| Reported Alerts                                    | List of reported alerts, such as B1-TCA B2-TCA B3-TCA, sent to the application layer.                                                                                                                                                                                                                                                                                                                        |
| Mask for Detected -> Reported                      | List of masked alerts for asserted alarms that are reported.                                                                                                                                                                                                                                                                                                                                                 |
| Alarm reporting enabled for                        | Types of alarms that generate an alarm message.                                                                                                                                                                                                                                                                                                                                                              |
| Alert reporting enabled for                        | Types of alarms that generate an alert message.                                                                                                                                                                                                                                                                                                                                                              |
| Framing                                            | Type of framing enabled on the controller.                                                                                                                                                                                                                                                                                                                                                                   |
| SPE Scrambling                                     | Status of synchronous payload envelope (SPE) scrambling: Enabled, Disabled.                                                                                                                                                                                                                                                                                                                                  |
| C2 State                                           | Value extracted from the SONET path signal label byte (C2).                                                                                                                                                                                                                                                                                                                                                  |

| Field                      | Description                                                                                                                                                                                    |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S1S0(tx)                   | Two S bits received in the last H1 byte.                                                                                                                                                       |
| PATH TRACE BUFFER          | SONET path trace buffer is used to communicate information regarding the remote hostname, interface name/number, and IP address. This use of the J1 (path trace) byte is proprietary to Cisco. |
| Remote hostname            | Name of the remote host.                                                                                                                                                                       |
| Remote interface           | Interface of the remote host.                                                                                                                                                                  |
| Remote IP addr             | IP address of the remote host.                                                                                                                                                                 |
| APS                        | Configuration status of the APS feature                                                                                                                                                        |
| APS Group                  | Indicates whether or not an APS group is configured.                                                                                                                                           |
| Protect Channel 0          | Indicates whether or not channel 0 is protected.                                                                                                                                               |
| Rx(K1/K2)/Tx(K1/K2)        | Contents of the received and transmitted K1 and K2 bytes at the local end in an APS configuration.                                                                                             |
| Remote Rx(K1/K2)/Tx(K1/K2) | Contents of the received and transmitted K1 and K2 bytes at the remote end in an APS configuration.                                                                                            |
| BER thresholds             | List of the bit error rate (BER) thresholds you configured with the <b>threshold</b> (SONET) command.                                                                                          |
| TCA thresholds             | List of threshold crossing alarms (TCA) you configured with the <b>threshold</b> (SONET) command.                                                                                              |
| Optics type                | Type of small form-factor pluggable (SFP) used in the associated port.                                                                                                                         |
| Tx laser current bias      | Measured laser bias current, in milliamps (mA). The valid range is 0 through 131 mA.                                                                                                           |
| Clock source               | Actual and configured clock source.                                                                                                                                                            |
| Optical Power Monitoring   | Power status of the SONET controller.                                                                                                                                                          |
| Tx laser current bias      | Current information, in milliamps (mA), in the transmit direction.                                                                                                                             |



[3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#)

The following is sample output from the **show controllers sonet** command with the **framers** option:

```
RP/0/RP0/CPU0:router# show controllers sonet 0/1/2/1 framers

Common Regs
reg[0] Master Reset and Identity 0x01
reg[1] Master Cfg 0000
reg[3] Master Clock Monitors 0x37
reg[100] Master Intr Status 1 0000
reg[101] Master Intr Status Ch 0-7 0000
reg[102] Master Intr Status Ch 8-15 0000
reg[1000] Master Clock Source Cfg 0000
reg[1001] Master DCC Interface Cfg 1 0x0f
reg[1002] Master DCC Interface Cfg 2 0000
reg[1004] APS Cfg and Status 0000
reg[1005] APS FIFO Cfg and Status 0x0f
reg[1006] APS Intr Status 1 0000
reg[1007] APS Intr Status 2 0000
reg[1008] APS Reset Ctrl 0000
reg[1010] TUL3 Interface Cfg 0x80
reg[1011] TUL3 Intr Status/Enable 1 0000
reg[1012] TUL3 Intr Status/Enable 2 0000
reg[1013] TUL3 ATM Level 3 FIFO Cfg 0x03
reg[1014] TUL3 ATM Level 3 Signal Label 0x01
reg[1015] TUL3 POS Level 3 FIFO Low Water Mark 0x15
reg[1016] TUL3 POS Level 3 FIFO High Water Mark 0x17
reg[1017] TUL3 POS Level 3 Signal Label 0000
reg[1018] TUL3 burst 0x0f
--More--
```

The following is sample output from the **show controllers sonet** command with the **internal-state** keyword:

```
RP/0/RP0/CPU0:router# show controllers sonet 0/1/2/1 internal-state

Interface(layer) admin_up if_state

SONET0/1/2/1 up up
(SONET Section) up up
(SONET Line) up up
(SONET Path) up up
SonetPath0/1/2/1 up up
 POS0/1/2/1 up up
```

**Table 89: show controllers sonet Field Descriptions**

| Field             | Description                       |
|-------------------|-----------------------------------|
| Interface (layer) | Slot number of the POS interface. |

- 3 1. section terminating equipment
- 4 2. line terminating equipment
- 5 3. path terminating equipment
- 6 4. loss of frame
- 7 5. loss of synchronization
- 8 6. alarm indication signal
- 9 7. bit interleaved parity
- 10 8. new data flag
- 11

| Field    | Description                                                                  |
|----------|------------------------------------------------------------------------------|
| admin_up | Whether the interface and its associated layers are in the admin-up state.   |
| if_state | Whether the interface and its associated layers are in the up or down state. |

# shutdown (SONET)

To disable SONET controller processing, use the **shutdown** command in SONET/SDH configuration mode. To bring back up a SONET controller and enable SONET controller processing, use the **no form of this** command.

**shutdown**

**no shutdown**

## Syntax Description

This command has no keywords or arguments.

## Command Default

The SONET controller is up, and SONET controller processing is enabled.

## Command Modes

SONET/SDH configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **shutdown** command to shut down a SONET controller and disable SONET controller processing. Use the **no shutdown** command to bring back up a SONET controller and enable SONET controller processing.

The SONET controller must be brought up for the proper operation of the Layer 2 interface. The Layer 2 interface has a separate **shutdown** command available, which does not operate on the SONET controller's administrative state.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to bring down the SONET controller and disable SONET controller processing:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/2
RP/0/RP0/CPU0:router(config-sonet)# shutdown
```

Related Commands

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers. |

# signalling

To configure the K1K2 overhead byte signaling protocol used for automatic protection switching (APS), use the **signalling** command in APS group configuration mode. To reset APS signaling to the default, use the **no** form of this command.

**signalling** {sonet| sdh}

**no signalling** {sonet| sdh}

## Syntax Description

|              |                                                        |
|--------------|--------------------------------------------------------|
| <b>sonet</b> | Sets signaling to SONET.                               |
| <b>sdh</b>   | Sets signaling to Synchronous Digital Hierarchy (SDH). |

## Command Default

SONET signaling is set by default.

## Command Modes

APS group configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

By default, APS uses the signaling mode matching the framing mode. The **signalling** command may be required, depending upon the transport equipment capabilities, only on “transition” links interconnecting SONET and SDH networks.

In a multirouter APS topology, the **signalling** command is allowed only on the protect router.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to reset the signaling protocol from the default SONET value to SDH:

```
RP/0/RP0/CPU0:router(config)# aps group 1
```

```
RP/0/RP0/CPU0:router(config-aps)# signalling sdh
```

The following example sets the signaling to SONET:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# signalling sonet
```

### Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps group, on page 974</a>     | Displays information about the APS groups.                                                 |

## timers (APS)

To change the time between hello packets and the time before the protect interface process declares a working interface router to be down, use the **timers** command in APS group configuration mode. To return to the default timers, use the **no** form of this command.

**timers** *hello-seconds hold-seconds*

**no timers**

### Syntax Description

|                      |                                                                                                                                                                                    |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>hello-seconds</i> | Number of seconds to wait before sending a hello packet (hello timer). Range is from 1 through 255 seconds. Default is 1 second.                                                   |
| <i>hold-seconds</i>  | Number of seconds to wait to receive a response from a hello packet before the interface is declared down (hold timer). Range is from 1 through 255 seconds. Default is 3 seconds. |

### Command Default

*hello-seconds*: 1

*hold-seconds*: 3

### Command Modes

APS group configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **timers** command to change the time between hello packets and the time before the protect interface process declares a working interface router to be down.

The hello time, in seconds, represents the interval between the periodic message exchange between the Protect Group Protocol (PGP) peers. The hold time, in seconds, represents the interval starting with the first failed periodic message after which, if no successful exchange takes place, the PGP link is declared dead.

If many multirouter APS groups are configured and the CPU load or the User Datagram Protocol (UDP) traffic associated with the PGP communication is considered too high, then the hello interval should be increased.

Increasing the hold time is suggested if the PGP link is flapping. The possible causes include high route processor (RP) CPU load, high traffic, or high error rates on the links between the working and the protect routers.

We recommend that you have a hold time at least three times longer than the hello time (allowing three or more consecutive failed periodic message exchange failures).

The **timers** command is typically used only on the protect router. After the PGP connection is established, the working router learns about the timer settings from the protect router and automatically adjusts accordingly, regardless of its own timer configuration.

The **timers** command is meaningful only in multirouter automatic protection switching (APS) topologies and is ignored otherwise.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to configure APS group 3 with the hello timer at 2 seconds and the hold timer at 6 seconds:

```
RP/0/RP0/CPU0:router(config)# aps group 3
RP/0/RP0/CPU0:router(config-aps)# timers 2 6
```

## Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps group, on page 974</a>     | Displays information about the APS groups.                                                 |



## threshold (SONET)

To set the bit error rate (BER) threshold values of the specified alarms for a SONET controller, use the **threshold** command in SONET/SDH configuration mode. To remove the setting of the threshold from the configuration file and restore the default condition, use the **no** form of this command.

**threshold** {b1-tca| b2-tca| sd-ber| sf-ber} *bit-error-rate*

**no threshold** {b1-tca| b2-tca| sd-ber| sf-ber} *bit-error-rate*

### Syntax Description

|                       |                                                                                              |
|-----------------------|----------------------------------------------------------------------------------------------|
| <b>b1-tca</b>         | Sets the B1 BER threshold crossing alarm (TCA). Range is from 3 through 9. Default is 10e-6. |
| <b>b2-tca</b>         | Sets the B2 BER threshold crossing alarm (TCA). Range is from 3 through 9. Default is 10e-6. |
| <b>sd-ber</b>         | Sets the signal degrade BER threshold. Range is from 3 through 9. Default is 10e-6.          |
| <b>sf-ber</b>         | Sets the signal failure BER threshold. Range is from 3 through 9. Default is 10e-3.          |
| <b>bit-error-rate</b> | BER from 3 to 9 (10 to the minus <i>x</i> ).                                                 |

### Command Default

**b1-tca:** 10e-6  
**b2-tca:** 10e-6  
**sd-ber:** 10e-6  
**sf-ber:** 10e-3

### Command Modes

SONET/SDH configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For B1, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B1 byte of the following frame. Differences indicate that section-level bit errors have occurred.

For B2, the BIP error report is calculated by comparing the BIP-8/24 code with the BIP-8 code that is extracted from the B2 byte of the following frame. Differences indicate that line-level bit errors have occurred.

Signal failure BER and signal degrade BER are sourced from B2 BIP-8 error counts (as is B2-TCA). The **b1-tca** and **b2-tca** keywords print only a log message to the console (if reports for them are enabled).

To determine the BER thresholds configured on the controller, use the **show controllers sonet** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to configure thresholds on the SONET controller:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# threshold sd-ber 8
RP/0/RP0/CPU0:router(config-sonet)# threshold sf-ber 4
RP/0/RP0/CPU0:router(config-sonet)# threshold b1-tca 4
```

## Related Commands

| Command                                                              | Description                                                                       |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">report (SONET)</a> , <a href="#">on page 962</a>         | Permits selected SONET alarms to be logged to the console for a SONET controller. |
| <a href="#">show controllers sonet</a> , <a href="#">on page 983</a> | Displays information about the operational status of SONET layers.                |

## threshold (SONET path)

To set the bit error rate (BER) threshold values of the specified alarms for a SONET path, use the **threshold** command in SONET/SDH path configuration mode. To remove the setting of the SONET path threshold from the configuration file and restore the default condition, use the **no** form of this command.

**threshold b3-tca** *bit-error-rate*

**no threshold b3-tca** *bit-error-rate*

### Syntax Description

|                       |                                                               |
|-----------------------|---------------------------------------------------------------|
| <b>b3-tca</b>         | Sets the B3 BER threshold crossing alarm (TCA). Default is 6. |
| <i>bit-error-rate</i> | BER from 3 to 9 (10 to the minus <i>x</i> ).                  |

### Command Default

**b3-tca:** 6

### Command Modes

SONET/SDH path configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For B3, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B3 byte of the following frame. Differences indicate that path-level bit errors have occurred.

In addition to BIP errors detected at the local end in the receive direction, B3 error counts detected in the G1 byte (P-REI or P-FEBE) by the far-end SONET equipment are returned.

The **b3-tca** keyword prints only a log message to the console (if reports for them are enabled).

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

In the following example, the BER is set to 4:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RP0/CPU0:router(config-sonet)# path
RP/0/RP0/CPU0:router(config-sonet-path)# threshold b3-tca 4
```

### Related Commands

| Command                                             | Description                                                                       |
|-----------------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">report (SONET), on page 962</a>         | Permits selected SONET alarms to be logged to the console for a SONET controller. |
| <a href="#">show controllers sonet, on page 983</a> | Displays information about the operational status of SONET layers.                |

## uneq-shut (SONET path)

To enable automatic insertion of P-UNEQ code (0x00) in the sent SONET path overhead C2 byte, use the **uneq-shut** command in SONET/SDH path configuration mode. To disable this feature, use the **no** form of this command.

**uneq-shut**

**no uneq-shut**

**Syntax Description** This command has no keywords or arguments.

**Command Default** Automatic insertion is enabled.

**Command Modes** SONET/SDH path configuration

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | Release 2.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **uneq-shut** command to disable automatic insertion of P-UNEQ code in the sent SONET path overhead C2 byte whenever the SONET path enters the administratively down state.

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

**Examples** In the following example, automatic insertion of P-UNEQ code is disabled in the sent SONET path overhead C2 byte:

```
RP/0/RP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RP0/CPU0:router(config-sonet)# path
RP/0/RP0/CPU0:router(config-sonet-path)# uneq-shut
```

# unidirectional

To configure a protect interface for unidirectional mode, use the **unidirectional** command in APS group configuration mode. To restore the default setting, bidirectional mode, use the **no** form of this command.

**unidirectional**

**no unidirectional**

## Syntax Description

This command has no keywords or arguments.

## Command Default

Bidirectional mode is the default mode for the protect interface.

## Command Modes

APS group configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 2.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **unidirectional** command to configure a protect interface for unidirectional mode. Use the **no** form of this command to restore the default setting.

The unidirectional or bidirectional automatic protection switching (APS) operation mode of the routers should be matched with the APS operation mode of the connected SONET equipment.



### Note

We recommend using bidirectional APS mode when it is supported by the interconnecting SONET equipment. When the protect interface is configured as unidirectional, the working and protect interfaces must cooperate to switch the transmit and receive SONET channel in a bidirectional fashion. Cooperation occurs automatically when the SONET network equipment is in bidirectional mode.

In a multirouter APS topology, the **unidirectional** command is allowed only on the protect router.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to configure an APS group for unidirectional mode:

```
RP/0/RP0/CPU0:router(config)# aps group 1
RP/0/RP0/CPU0:router(config-aps)# unidirectional
```

## Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 918</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps, on page 970</a>           | Displays the operational status for all configured SONET APS groups.                       |

**unidirectional**





## SRP Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring Spatial Reuse Protocol (SRP) on supported Cisco Dynamic Packet Transport (DPT) interfaces.

SRP is a MAC-layer protocol developed by Cisco and is used in conjunction with Cisco DPT products. DPT products deliver scalable Internet service, reliable IP-aware optical transport, and simplified network operations. These solutions allow you to scale and distribute your IP services across a reliable optical packet ring infrastructure.



### Note

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Throughout the remainder of this publication, the term SRP is used to describe features related to the DPT product family.

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- [clear srp counters](#), page 1006
- [hw-module port](#), page 1010
- [interface srp](#), page 1013
- [show controllers srp](#), page 1015
- [show srp](#), page 1017
- [srp ips delay trigger-keepalive](#), page 1029
- [srp ips request forced-switch](#), page 1031
- [srp ips timer](#), page 1033
- [srp ips wtr-timer](#), page 1035
- [srp mac-count](#), page 1037
- [srp mac-reject](#), page 1039
- [srp manual-switch](#), page 1041
- [srp priority-threshold](#), page 1043
- [srp rate-limit](#), page 1044
- [srp shutdown](#), page 1045
- [srp topology-timer](#), page 1047

# clear srp counters

To clear the SRP counters, use the **clear srp counters** command in EXEC mode.

**clear srp counters** {[**interface srp** *interface-path-id*] **location** *node-id*}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface srp</b>     | Specifies the SRP interface.                                                                                                                                                                                                                                                    |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was introduced on the 16-port OC-48c/STM-16c POS/DPT PLIM.                       |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

The **clear srp counters** command clears the counters displayed in the following commands:

- show controllers srp rac-error
- show srp counters
- show srp counters source
- show srp transit

## Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

## Examples

The following example shows how to use the **clear srp counters** command to make the counts displayed from the **show srp source-counters** command return to zero:

```
RP/0/RP0/CPU0:router# show srp counters interface srp 0/7/0/0
```

Data Traffic Counters for Interface SRP0/7/0/0

```
Side A:
Transit
 Total Low Priority: Packets Bytes
 Total High Priority: 183 768543
 Total Multicast: 174 767913
 Total Unicast: 9 630
Host Receive
 Unicast Low Priority: 6 648
 Unicast High Priority: 0 0
 Multicast Low Priority: 0 0
 Multicast High Priority: 1 41
Total Receive
 Unicast Low Priority: 6 648
 Unicast High Priority: 9 630
 Multicast Low Priority: 3 144
 Multicast High Priority: 174 767913
Host Transmit
 Unicast Low Priority: 4 480
 Unicast High Priority: 0 0
 Multicast Low Priority: 0 0
 Multicast High Priority: 0 0
Total Transmit
 Unicast Low Priority: 4 480
 Unicast High Priority: 0 0
 Multicast Low Priority: 0 0
 Multicast High Priority: 772 1575090
Traffic Rate (5 Minutes)
 Transit Low Priority packets/sec bits/sec
 Transit High Priority 0 0
 Transit Multicast 0 0
 Transit Unicast 0 0
 Host Receive 0 0
 Total Receive 0 0
 Host Transmit 0 0
 Total Transmit 0 0
Received Errors:
 0 input errors, 0 CRC, 0 ignored,
 0 framer runts, 0 framer giants, 0 framer aborts,
 0 mac runts, 0 mac giants, 0 mac ttl strips

Side B:
Transit
 Total Low Priority: Packets Bytes
 Total Low Priority: 0 0
```

## clear srp counters

```

Total High Priority: 772 1575090
Total Multicast: 772 1575090
Total Unicast: 0 0
Host Receive Packets Bytes
Unicast Low Priority: 6 648
Unicast High Priority: 0 0
Multicast Low Priority: 0 0
Multicast High Priority: 1 41
Total Receive Packets Bytes
Unicast Low Priority: 6 648
Unicast High Priority: 0 0
Multicast Low Priority: 0 0
Multicast High Priority: 772 1575090
Host Transmit Packets Bytes
Unicast Low Priority: 6 720
Unicast High Priority: 0 0
Multicast Low Priority: 3 144
Multicast High Priority: 0 0
Total Transmit Packets Bytes
Unicast Low Priority: 6 720
Unicast High Priority: 9 630
Multicast Low Priority: 3 144
Multicast High Priority: 174 767913
Traffic Rate (5 Minutes) packets/sec bits/sec
Transit Low Priority 0 0
Transit High Priority 0 0
Transit Multicast 0 0
Transit Unicast 0 0
Host Receive 0 0
Total Receive 0 0
Host Transmit 0 0
Total Transmit 0 0
Received Errors:
 0 input errors, 0 CRC, 0 ignored,
 0 framer runts, 0 framer giants, 0 framer aborts,
 0 mac runts, 0 mac giants, 0 mac ttl strips

```

```

RP/0/RP0/CPU0:router# clear srp counters interface srp 0/7/0/0
RP/0/RP0/CPU0:router# show srp counters interface srp 0/7/0/0

```

```

Data Traffic Counters for Interface SRP0/7/0/0
Side A:
Transit Packets Bytes
Total Low Priority: 0 0
Total High Priority: 0 0
Total Multicast: 0 0
Total Unicast: 0 0
Host Receive Packets Bytes
Unicast Low Priority: 0 0
Unicast High Priority: 0 0
Multicast Low Priority: 0 0
Multicast High Priority: 0 0
Total Receive Packets Bytes
Unicast Low Priority: 0 0
Unicast High Priority: 0 0
Multicast Low Priority: 0 0
Multicast High Priority: 0 0
Host Transmit Packets Bytes
Unicast Low Priority: 0 0
Unicast High Priority: 0 0
Multicast Low Priority: 0 0
Multicast High Priority: 0 0
Total Transmit Packets Bytes
Unicast Low Priority: 0 0
Unicast High Priority: 0 0
Multicast Low Priority: 0 0
Multicast High Priority: 0 0
Traffic Rate (5 Minutes) packets/sec bits/sec
Transit Low Priority 0 0
Transit High Priority 0 0
Transit Multicast 0 0
Transit Unicast 0 0
Host Receive 0 0

```

```

Total Receive 0 0
Host Transmit 0 0
Total Transmit 0 0
Received Errors:
 0 input errors, 0 CRC, 0 ignored,
 0 framer runts, 0 framer giants, 0 framer aborts,
 0 mac runts, 0 mac giants, 0 mac ttl strips

Side B:
Transit Packets Bytes
 Total Low Priority: 0 0
 Total High Priority: 0 0
 Total Multicast: 0 0
 Total Unicast: 0 0
Host Receive Packets Bytes
 Unicast Low Priority: 0 0
 Unicast High Priority: 0 0
 Multicast Low Priority: 0 0
 Multicast High Priority: 0 0
Total Receive Packets Bytes
 Unicast Low Priority: 0 0
 Unicast High Priority: 0 0
 Multicast Low Priority: 0 0
 Multicast High Priority: 0 0
Host Transmit Packets Bytes
 Unicast Low Priority: 0 0
 Unicast High Priority: 0 0
 Multicast Low Priority: 0 0
 Multicast High Priority: 0 0
Total Transmit Packets Bytes
 Unicast Low Priority: 0 0
 Unicast High Priority: 0 0
 Multicast Low Priority: 0 0
 Multicast High Priority: 0 0
Traffic Rate (5 Minutes) packets/sec bits/sec
Transit Low Priority 0 0
Transit High Priority 0 0
Transit Multicast 0 0
Transit Unicast 0 0
Host Receive 0 0
Total Receive 0 0
Host Transmit 0 0
Total Transmit 0 0
Received Errors:
 0 input errors, 0 CRC, 0 ignored,
 0 framer runts, 0 framer giants, 0 framer aborts,
 0 mac runts, 0 mac giants, 0 mac ttl strips

```

# hw-module port

To enable a port to be used for SRP, use the **hw-module port** command in global configuration mode. To disable SRP and enable the port for Packet over SONET (POS), use the **no** form of this command.

```
hw-module port port-number srp location node-id spa-bay number
no hw-module port port-number srp location node-id spa-bay number
```

## Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>port-number</i> | Number of the physical interface on the PLIM or SPA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| srp                | Specifies an SRP interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>location</b>    | Specifies the location of the module.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>node-id</i>     | Location of the PLIM or SPA, in the <i>rack/slot/module</i> notation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| spa-bay            | Bay number of one of the following: <ul style="list-style-type: none"> <li>• 16-port OC-48c/STM-16c POS/DPT PLIM</li> <li>• 4-port OC-192c/STM-64c POS/DPT PLIM</li> <li>• 1-port OC-192/STM-64 POS/RPR SPA XFP optics</li> <li>• 4-port OC-48/STM-16 POS/RPR SPA</li> <li>• 2-port OC-48/STM-16 POS/RPR SPA</li> </ul> <div> <div>Note</div> <div>After this command is executed, the SPA must be reloaded to apply the configuration and create the SRP ports. On the OC-192 SPAs, both SPAs at each end of the SRP interface must be reloaded.</div> </div> |
| number             | Number of the SPA bay.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Command Default

When there is no **hw-module port** configuration, ports are enabled for POS by default.

## Command Modes

Global configuration

## Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

| Release       | Modification                                                                                                                                                                                                                                                                                      |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.8.0 | <p>This command was first supported on the following SPAs:</p> <ul style="list-style-type: none"> <li>• 1-port OC-192/STM-64 POS/RPR SPA XFP optics</li> <li>• 4-port OC-48/STM-16 POS/RPR SPA</li> <li>• 2-port OC-48/STM-16 POS/RPR SPA</li> </ul> <p>The <b>spa-bay</b> keyword was added.</p> |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

POS is the default port mode on POS/DPT PLIMs and SPAs. Use the **hw-module port** command to allow the ports to be configured for SRP use.

SRP requires two consecutive physical ports for use as a single SRP interface. The first port must be even numbered and the second port must be odd numbered. No other combinations are allowed. You must use this command on both of the ports to be used as an SRP interface. SRP interfaces take the number of the lower, even-numbered port. For example, if ports 0/1/0/2 and 0/1/0/3 are enabled as an SRP interface, the interface would be referred to as SRP0/1/0/2.

On the 16-port OC-48c/STM-16c POS/DPT PLIM, groups of four consecutive ports must be configured the same. Ports 0 through 3 must all be configured as either SRP or POS. The same is true for ports 4 through 7, 8 through 11, and 12 through 15. All four ports must be on the same SPA bay.

On the 4-port OC-192c/STM-64c POS/DPT PLIM, groups of two ports must be configured the same; either as SRP or POS. The two ports must be on different SPA bays; either 0, 1, or 2 or 3, 4, or 5.

After using the **hw-module port** command, you must save the configuration and reload the PLIM or SPA to enable this configuration change and create the SRP or POS interface. For the PLIMs, use the **hw-module location reload** command in EXEC mode. For all SPAs except for the 1-port OC-192/STM-64 POS/RPR SPA XFP optics, use the **hw-module subslot reload** command in EXEC mode. For the OC-192/STM-64 POS/RPR SPA, use the **hw-module subslot shutdown** command in global configuration mode to shut down the SPA, then the **no hw-module subslot shutdown** command in the same mode to return the SPA to the up state. We do not recommend using the **hw-module subslot reload** command to reload the OC-192/STM-64 POS/RPR SPA, because doing so can cause synchronization problems with the two SPAs and processes that comprise a SRP interface.

To disable SRP and reenables POS on the port, use the **no** form of the command.



#### Note

Internal clocking is required for SRP interfaces. Use the clock source internal command in SONET configuration mode to configure the clock source.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| root-lr | read, write |

## Examples

In the following example, ports 0 through 3 are enabled for SRP on the PLIM:

```
RP/0/RP0/CPU0:Router(config)# hw-module port 0 srp location 0/1/cpu0
RP/0/RP0/CPU0:Router(config)# hw-module port 1 srp location 0/1/cpu0
RP/0/RP0/CPU0:Router(config)# hw-module port 2 srp location 0/1/cpu0
RP/0/RP0/CPU0:Router(config)# hw-module port 3 srp location 0/1/cpu0
RP/0/RP0/CPU0:Router(config)# exit
RP/0/RP0/CPU0:Router# hw-module location 0/1/CPU0 reload
```

In the following example, ports 0 and 1 are enabled for SRP on the PLIM:

```
RP/0/RP0/CPU0:Router(config)# hw-module port 0 srp location 0/1/cpu0
RP/0/RP0/CPU0:Router(config)# hw-module port 1 srp location 0/1/cpu0
RP/0/RP0/CPU0:Router(config)# exit
RP/0/RP0/CPU0:Router# hw-module location 0/1/CPU0 reload
```

In the following example, ports 0, 1, 2, and 3 are enabled for SRP on the SPA:

```
RP/0/RP0/CPU0:router(config)# hw-module port 0 srp location 0/3/CPU0 spa-bay 2
RP/0/RP0/CPU0:router(config)# hw-module port 1 srp location 0/3/CPU0 spa-bay 2
RP/0/RP0/CPU0:router(config)# hw-module port 2 srp location 0/3/CPU0 spa-bay 2
RP/0/RP0/CPU0:router(config)# hw-module port 3 srp location 0/3/CPU0 spa-bay 2
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:router(config)# end
RP/0/RP0/CPU0:router# hw-module subslot 0/3/CPU0 reload
```

```
RP/0/RP0/CPU0:router(config)# hw-module port 0 srp location 0/3/CPU0 spa-bay 0
RP/0/RP0/CPU0:router(config)# hw-module port 0 srp location 0/3/CPU0 spa-bay 1
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:router(config)# hw-module subslot 0/3/0 shutdown
RP/0/RP0/CPU0:router(config)# hw-module subslot 0/3/1 shutdown
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:router(config)# no hw-module subslot 0/3/0 shutdown
RP/0/RP0/CPU0:router(config)# no hw-module subslot 0/3/1 shutdown
RP/0/RP0/CPU0:router(config)# commit
```

## Related Commands

| Command                              | Description                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------|
| <b>clock source internal</b>         | Configures SONET clocking as internal.                                           |
| <b>hw-module location reload</b>     | Reloads all PLIMs.                                                               |
| <b>hw-module subslot reload</b>      | Reloads all SPAs except the for the 1-port OC-192/STM-64 POS/RPR SPA XFP optics. |
| <b>hw-module subslot shutdown</b>    | Administratively shuts down a SPA.                                               |
| <b>no hw-module subslot shutdown</b> | Returns a SPA to the up state.                                                   |



## interface srp

To configure the SRP protocol on a DPT interface and enter interface configuration mode, use the **interface srp** command in global configuration mode.

**interface srp** *interface-path-id* [**arp** | **bandwidth** | **cdp** | **dampening** | **description** | **flow** | **ipv4** | **ipv6** | **load-interval** | **mac-address** | **mpls** | **mtu** | **ppp** | **proxy-arp** | **service-policy** | **shutdown** | **srp** | **vrf**]

### Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>arp</b>               | Configures Address Resolution Protocol (ARP) on the interface.                                                                                                                                                                                                                  |
| <b>bandwidth</b>         | Sets the bandwidth for the interface.                                                                                                                                                                                                                                           |
| <b>cdp</b>               | Enables Cisco Discovery Protocol (CDP) on the interface.                                                                                                                                                                                                                        |
| <b>dampening</b>         | Configures state dampening on the interface.                                                                                                                                                                                                                                    |
| <b>description</b>       | Sets the description for this interface.                                                                                                                                                                                                                                        |
| <b>flow</b>              | Enables NetFlow configuration on the interface.                                                                                                                                                                                                                                 |
| <b>ipv4</b>              | Enables IPv4 address subcommands on the interface.                                                                                                                                                                                                                              |
| <b>ipv6</b>              | Enables IPv6 address subcommands on the interface.                                                                                                                                                                                                                              |
| <b>load-interval</b>     | Configures the interval for load calculation on the interface.                                                                                                                                                                                                                  |
| <b>mac-address</b>       | Sets the Mac address (xxxx.xxxx.xxxx) on the interface.                                                                                                                                                                                                                         |
| <b>mpls</b>              | Enables MPLS subcommands on the interface.                                                                                                                                                                                                                                      |
| <b>mtu</b>               | Sets the maximum transmission unit (MTU) for the interface.                                                                                                                                                                                                                     |
| <b>ppp</b>               | Enables Point-to-Point Protocol (PPP) on the interface.                                                                                                                                                                                                                         |
| <b>proxy-arp</b>         | Enables proxy Address Resolution Protocol (ARP) on the interface.                                                                                                                                                                                                               |
| <b>service-policy</b>    | Configures a QoS policy on the interface.                                                                                                                                                                                                                                       |
| <b>shutdown</b>          | Shuts down the interface.                                                                                                                                                                                                                                                       |
| <b>srp</b>               | Enables SRP parameters on the interface.                                                                                                                                                                                                                                        |
| <b>vrf</b>               | Sets the VRF in which the interface operates.                                                                                                                                                                                                                                   |

**Command Default** No default behavior or values

**Command Modes** Global configuration

| Command History | Release       | Modification                                                                                                                                                                                     |
|-----------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM.                                                                                                    |
|                 | Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                                                                                                                     |
|                 | Release 3.8.0 | The following new keywords were added, arp, bandwidth, cdp, dampening, description, flow, ipv4, ipv6, load-interval, mac-address, mpls, mtu, ppp, proxy-arp, service-policy, shutdown, srp, vrf. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | interface | read, write |

**Examples** The following example shows how to enter srp interface mode:

```
RP/0/RP0/CPU0:router(config)# interface srp 0/1/0/0
RP/0/RP0/CPU0:router(config-if)#
```

# show controllers srp

To display information on the SRP controllers, use the **show controllers srp** command in EXEC mode.

**show controllers srp** *interface-path-id* **side** {**a**|**b**} [**rac-error**|**rac-reg**] **ucode-inst**| **ucode-reg**}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>side</b>              | Specify the side of the node.                                                                                                                                                                                                                                                   |
| <b>a</b>                 | The side of a node that has outer ring receive fiber is identified as side A.                                                                                                                                                                                                   |
| <b>b</b>                 | The side of a node that has inner ring receive fiber is identified as side B.                                                                                                                                                                                                   |
| <b>rac-error</b>         | Displays the error reported by the Ring Access Controller (RAC) device.                                                                                                                                                                                                         |
| <b>rac-reg</b>           | Displays the value of the RAC device register set.                                                                                                                                                                                                                              |
| <b>ucode-inst</b>        | Displays the RAC micro-controller binary code instruction set (currently loaded or executing) in hexadecimal format.<br><br><b>Note</b> This is an intrusive command that will cause adjacent nodes to detect a MAC keepalive failure and then wrap.                            |
| <b>ucode-reg</b>         | Displays the RAC micro-controller register set.                                                                                                                                                                                                                                 |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

Examples

This example shows how to display the RAC registers for a specified SRP interface:

```
RP/0/RP0/CPU0:router# show controllers srp 0/5/0/0 side a rac-reg
```

Related Commands

| Command                                | Description                                  |
|----------------------------------------|----------------------------------------------|
| <a href="#">show srp, on page 1017</a> | Displays information about an SRP interface. |

# show srp

To display information about an SRP interface, use the **show srp** command in EXEC mode.

**show srp** [**counters** [**source**]] [**failures**] [**ips**] [**platform**] [**srr**] [**topology**] [**transit**] [**interface srp** *interface-path-id*] [**location** *node-id*]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>counters</b>          | (Optional) Displays counters for the packets received, transmitted, and transited on both sides of an SRP node.                                                                                                                                                             |
| <b>source</b>            | (Optional) Displays the counters for the SRP source address.                                                                                                                                                                                                                |
| <b>failures</b>          | (Optional) Displays all SRP failures that were detected by the router.                                                                                                                                                                                                      |
| <b>ips</b>               | (Optional) Displays the Intelligent Protection Switching (IPS) status.                                                                                                                                                                                                      |
| <b>platform</b>          | (Optional) Displays platform-specific SRP interface details.                                                                                                                                                                                                                |
| <b>srr</b>               | (Optional) Displays single ring recovery (SRR) information.                                                                                                                                                                                                                 |
| <b>topology</b>          | (Optional) Identifies the nodes on the ring.                                                                                                                                                                                                                                |
| <b>transit</b>           | (Optional) Displays transit delays (in nanoseconds) between the time that a packet enters the transit buffer and the time it comes back on the ring.                                                                                                                        |
| <b>interface</b>         | (Optional) Specifies the interface for which to display the counters.                                                                                                                                                                                                       |
| <b>srp</b>               | (Optional) Specifies an SRP interface.                                                                                                                                                                                                                                      |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>location</b>          | (Optional) Specifies the location of the module.                                                                                                                                                                                                                            |
| <i>node-id</i>           | Location of the module in the <i>rack/slot/module</i> notation.                                                                                                                                                                                                             |

## Command Default

No default behavior or values

## Command Modes

EXEC

**Command History**

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To clear the SRP counters, use the [clear srp counters, on page 1006](#) command. The **show srp** command with the **counters** keyword reports the per-side counters and rates for various packet paths.

The **show srp** command with the **failures** keyword reports the SRP failures that were detected by the router. Use the **failures** keyword when an SRP interface is wrapped and you want to display information about the cause of the failure.

Use the **transit** keyword to determine the approximate latency when transmitting a packet, which due to higher latency, gives the approximation of congestion at this interface. If there is no latency, there is no congestion. Latency indicates that traffic transiting the ring and transmitted from the host are competing, meaning there is congestion.

Regarding the **topology** keyword, Address Resolution Protocol (ARP) is independent of the Layer 2 topology mapping. In other words, the absence of a MAC address in the topology map does not prevent ARP or any Layer 3 protocol from reaching the node. Alternatively, the presence of a MAC address in the topology map does not mean that it is possible to resolve the Layer 3 address. The topology map is used to determine the most efficient side (in hops) to use to reach any given MAC address.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

**Task ID**

| Task ID | Operations |
|---------|------------|
| pos-dpt | read       |

**Examples**

In the following example, output from the **show srp** command with the **counters** keyword is displayed:

```
RP/0/RP0/CPU0:router# show srp counters interface srp 0/7/0/0
```

Data Traffic Counters for Interface SRP0/7/0/0

Side A:

|                                                   |             |          |
|---------------------------------------------------|-------------|----------|
| Transit                                           | Packets     | Bytes    |
| Total Low Priority:                               | 0           | 0        |
| Total High Priority:                              | 183         | 768543   |
| Total Multicast:                                  | 174         | 767913   |
| Total Unicast:                                    | 9           | 630      |
| Host Receive                                      | Packets     | Bytes    |
| Unicast Low Priority:                             | 6           | 648      |
| Unicast High Priority:                            | 0           | 0        |
| Multicast Low Priority:                           | 0           | 0        |
| Multicast High Priority:                          | 1           | 41       |
| Total Receive                                     | Packets     | Bytes    |
| Unicast Low Priority:                             | 6           | 648      |
| Unicast High Priority:                            | 9           | 630      |
| Multicast Low Priority:                           | 3           | 144      |
| Multicast High Priority:                          | 174         | 767913   |
| Host Transmit                                     | Packets     | Bytes    |
| Unicast Low Priority:                             | 4           | 480      |
| Unicast High Priority:                            | 0           | 0        |
| Multicast Low Priority:                           | 0           | 0        |
| Multicast High Priority:                          | 0           | 0        |
| Total Transmit                                    | Packets     | Bytes    |
| Unicast Low Priority:                             | 4           | 480      |
| Unicast High Priority:                            | 0           | 0        |
| Multicast Low Priority:                           | 0           | 0        |
| Multicast High Priority:                          | 772         | 1575090  |
| Traffic Rate (5 Minutes)                          | packets/sec | bits/sec |
| Transit Low Priority                              | 0           | 0        |
| Transit High Priority                             | 0           | 0        |
| Transit Multicast                                 | 0           | 0        |
| Transit Unicast                                   | 0           | 0        |
| Host Receive                                      | 0           | 0        |
| Total Receive                                     | 0           | 0        |
| Host Transmit                                     | 0           | 0        |
| Total Transmit                                    | 0           | 0        |
| Received Errors:                                  |             |          |
| 0 input errors, 0 CRC, 0 ignored,                 |             |          |
| 0 framer runts, 0 framer giants, 0 framer aborts, |             |          |
| 0 mac runts, 0 mac giants, 0 mac ttl strips       |             |          |

Side B:

|                          |         |         |
|--------------------------|---------|---------|
| Transit                  | Packets | Bytes   |
| Total Low Priority:      | 0       | 0       |
| Total High Priority:     | 772     | 1575090 |
| Total Multicast:         | 772     | 1575090 |
| Total Unicast:           | 0       | 0       |
| Host Receive             | Packets | Bytes   |
| Unicast Low Priority:    | 6       | 648     |
| Unicast High Priority:   | 0       | 0       |
| Multicast Low Priority:  | 0       | 0       |
| Multicast High Priority: | 1       | 41      |
| Total Receive            | Packets | Bytes   |
| Unicast Low Priority:    | 6       | 648     |
| Unicast High Priority:   | 0       | 0       |
| Multicast Low Priority:  | 0       | 0       |
| Multicast High Priority: | 772     | 1575090 |
| Host Transmit            | Packets | Bytes   |
| Unicast Low Priority:    | 6       | 720     |
| Unicast High Priority:   | 0       | 0       |
| Multicast Low Priority:  | 3       | 144     |
| Multicast High Priority: | 0       | 0       |
| Total Transmit           | Packets | Bytes   |
| Unicast Low Priority:    | 6       | 720     |
| Unicast High Priority:   | 9       | 630     |

```

Multicast Low Priority: 3 144
Multicast High Priority: 174 767913
Traffic Rate (5 Minutes) packets/sec bits/sec
Transit Low Priority 0 0
Transit High Priority 0 0
Transit Multicast 0 0
Transit Unicast 0 0
Host Receive 0 0
Total Receive 0 0
Host Transmit 0 0
Total Transmit 0 0
Received Errors:
 0 input errors, 0 CRC, 0 ignored,
 0 framer runs, 0 framer giants, 0 framer aborts,
 0 mac runs, 0 mac giants, 0 mac ttl strips

```

**Table 90: show srp counters Command Output Fields**

| Field                                   | Description                                                                                                                                                                                   |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Side A                                  | Header for packets received, transmitted, and transited by the Resource Availability Confirmation (RAC) device on side A.                                                                     |
| Side B                                  | Header for packets received, transmitted, and transited by the RAC device on side B.                                                                                                          |
| TransitTotal Low Priority               | Total number of unicast and multicast packets marked as SRP low priority (based on the SRP priority mapping) that transit the router and are counted in the transmit low-priority counters.   |
| TransitTotal High Priority              | Total number of unicast and multicast packets marked as SRP high priority (based on the SRP priority mapping) that transit the router and are counted in the transmit high-priority counters. |
| TransitTotal Multicast                  | Total number of low- and high-priority multicast packets that transit the router and are counted in the transmit multicast counters.                                                          |
| TransitTotal Unicast                    | Total number of low- and high-priority unicast packets that transit the router and are counted in the transmit unicast counters.                                                              |
| Host ReceiveUnicast Low/High priority   | Total number of low- and high-priority unicast packets received by the router.                                                                                                                |
| Host ReceiveMulticast Low/High priority | Total number of low- and high-priority multicast packets received by the router.                                                                                                              |
| Total ReceiveUnicast Low/High priority  | Total number of low- and high-priority unicast packets that transit or are received by the router.                                                                                            |



| Field                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total ReceiveMulticast Low/High priority  | Total number of low- and high-priority multicast packets that transit or are received by the router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Host TransmitUnicast Low/High priority    | Total number of low- and high-priority unicast packets sourced onto the ring by the router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Host TransmitMulticast Low/High priority  | Total number of low- and high-priority multicast packets sourced onto the ring by the router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Total TransmitUnicast Low/High priority   | Total number of low- and high-priority unicast packets transmitted by this side and transited out of the other side of the node.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Total TransmitMulticast Low/High priority | Total number of low- and high-priority multicast packets transmitted by this side and transited out of the other side of the node.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Traffic Rate (5 Minutes)                  | <p>Average number of packets and bits transmitted per second during the last 5 minutes.</p> <p>The 5-minute traffic rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average is within two percent of the instantaneous rate of a uniform stream of traffic over that period.</p> <p>The 5-minute value is the load interval, and it is configurable using the <b>load-interval</b> command.</p> |
| input errors                              | Total number of no buffer, runs, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum might not balance with the other counts.                                                                                                                                                                                                                                                                                                                                                                                |
| CRC                                       | Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of a station transmitting bad data.                                                                                                                                                                                                                                            |
| ignored                                   | Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be increased.                                                                                                                                                                                                                                                                                       |

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| framer runts   | Number of packets dropped by the framer as runts, that are smaller than 16 bytes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| framer giants  | Number of packets dropped by the framer as giants, whose size is greater than the MTU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| framer aborts  | <p>Number of packets dropped by the framer due to an error in packet insertion from the SONET frame. Normally a framer abort is caused by a delimiter inserted at the transmit framer that forces the receive framer to drop the packet on reception because it is bad. The delimiter is inserted by the transmit framer when it cannot transmit a packet due to a transmission error. A runt or CRC error may also result. A framer abort can be caused by any of the following:</p> <ul style="list-style-type: none"> <li>• A bad transmit framer at the neighbor node (upstream)</li> <li>• BIP errors in the SONET frame that cause a false abort delimiter (often due to intermediate equipment failure or clocking issues)</li> <li>• A bad receive framer at this node</li> </ul> |
| mac runts      | Packets dropped by the MAC controller as runts, that are smaller than 24 bytes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| mac giants     | Packets dropped by the MAC controller as giants, whose size is greater than the MTU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| mac ttl strips | Packets stripped by the MAC controller when the SRP Time to Live value expires. (TTL value is 1 when a packet arrives.) These packets are removed from the ring because the TTL value cannot be decreased. As a result, the packet is dropped if it is not destined for the node that strips it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

In the following example, self-detected failures in the SRP interface configured on slot 7, subslot 0, and port 0 are displayed:

```
RP/0/RP0/CPU0:router# show srp failures
```

```
Self Detected Failures Information for Interface SRP0/7/0/0
```

```
Side A:
```

|                | Reported<br>state | Debounced<br>state | Current<br>state | Stable<br>for (sec) | Debounce<br>delay (sec) |
|----------------|-------------------|--------------------|------------------|---------------------|-------------------------|
| HW missing     | IDLE              | IDLE               | IDLE             | 778                 | 0                       |
| L1 Admin State | IDLE              | IDLE               | IDLE             | 777                 | 0                       |
| Layer 1        | IDLE              | IDLE               | IDLE             | 778                 | 0                       |
| MAC Keepalive  | IDLE              | IDLE               | IDLE             | 477                 | 5                       |
| Link quality   | IDLE              | IDLE               | IDLE             | 778                 | 0                       |

```

Mate interface IDLE IDLE IDLE 778 10
Side mismatch IDLE IDLE IDLE 477 5
Result Self Detect = IDLE

Side B:
 Reported state Debounced state Current state Stable for(sec) Debounce delay(sec)
HW missing IDLE IDLE IDLE 778 0
L1 Admin State IDLE IDLE IDLE 775 0
Layer 1 IDLE IDLE IDLE 778 0
MAC Keepalive IDLE IDLE IDLE 477 5
Link quality IDLE IDLE IDLE 778 0
Mate interface IDLE IDLE IDLE 778 10
Side mismatch IDLE IDLE IDLE 477 5
Result Self Detect = IDLE

```

**Table 91: show srp failures Command Output Fields**

| Field          | Description                                                                                                                                                                                                                                                                                                                         |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HW missing     | Presence of this side's hardware port. Possible states:<br>IDLE—No error or failure<br>SF—Port is not installed or is still booting                                                                                                                                                                                                 |
| L1 Admin State | Layer 1 administrative state. Possible states:<br>IDLE—SONET controller is configured as up<br>FS—SONET controller is configured as administratively down<br><br><b>Note</b> This is the only field in which the status is related to a user-configurable state.                                                                    |
| Layer 1        | Operating state of the SONET controller. Possible states:<br>IDLE—No alarms, etc.<br>SF—Some alarms, such as section loss of signal (SLOS), section loss of frame (SLOF), or line alarm indicator signal (LAIS)<br><br><b>Note</b> For detailed information about a Layer 1 failure, use the <b>show controllers sonet</b> command. |
| MAC keepalive  | The MAC keepalive timer has expired.                                                                                                                                                                                                                                                                                                |
| Link quality   | The SONET B3 bit error rate (BER) threshold has been crossed. To configure SRP signal degrade detection and signal fail detection, use the <a href="#">srp priority-threshold</a> , on page 1043 command.                                                                                                                           |
| Mate interface | The external mate cable on a line card interface is missing or malfunctioning.<br><br><b>Note</b> This is only applicable to one-port PLIMs or SPAs that would require a second PLIM or SPA to create an SRP interface.                                                                                                             |
| Side mismatch  | Side A of the node is connected to side A of the neighbor node, or side B of the node is connected to side B of the neighbor node.                                                                                                                                                                                                  |

| Field                | Description                                                                                                                                                                                                                   |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Result Self Detect   | IPS state requested for this side. The state is the highest IPS request listed under “Reported state.”                                                                                                                        |
| Reported state       | State that is reported to the IPS engine.                                                                                                                                                                                     |
| Debounce state       | Current SF/FS state or the current IDLE state if IDLE has been stable for the amount of time of the debounce delay.                                                                                                           |
| Current state        | Current state as reported by the source.                                                                                                                                                                                      |
| Stable for (sec)     | Amount of time the current state has been stable.                                                                                                                                                                             |
| Debounce delay (sec) | Amount of time to wait when transitioning from SF to IDLE. The IDLE state must be stable for this amount of time before getting debounced or reported. This is to prevent flapping and is similar to higher-level WTR values. |

In the following example, the display from the **show srp** command with the **interface** keyword is shown:

```
RP/0/RP0/CPU0:router# show srp interface srp 0/5/0/0

IPS Information for Interface SRP0/5/0/0
MAC Addresses
 Side A (Outer ring RX) neighbor 0009.11d8.3c66
 Side B (Inner ring RX) neighbor 0012.da6a.f664
 Node MAC address 0800.453d.8644
IPS State
 Side A not wrapped
 Side B not wrapped
 Side A (Inner ring TX) IPS pkt. sent every 1 sec. (next pkt. after 1 sec.)
 Side B (Outer ring TX) IPS pkt. sent every 1 sec. (next pkt. after 1 sec.)
 inter card bus disabled
 IPS WTR period is 60 sec. (timer is inactive)
 Node IPS State: idle
IPS Self Detected Requests IPS Remote Requests
 Side A IDLE Side A IDLE
 Side B IDLE Side B IDLE
 Side A Failures: none
 Side B Failures: none
IPS messages received
 Side A (Outer ring RX) { 0009.11d8.3c66,IDLE,SHORT}, TTL 255
 Side B (Inner ring RX) { 0012.da6a.f664,IDLE,SHORT}, TTL 255
IPS messages transmitted
 Side A (Inner ring TX) { 0800.453d.8644,IDLE,SHORT}, TTL 255
 Side B (Outer ring TX) { 0800.453d.8644,IDLE,SHORT}, TTL 255
IPS delay trigger keepalive
 Side A: 0 milliseconds
 Side B: 0 milliseconds

Topology Map for Interface: SRP0/5/0/0
Topology pkt. sent every 5 sec. (next pkt. after 1 sec.)
Last received topology pkt. 00:00:05
Last topology change was 00:01:59 ago.
Nodes on the ring: 3
Hops (outer ring) MAC IP Address Wrapped SRR Name
0 0800.453d.8644 0.0.0.0 No - ios
1 0012.da6a.f664 0.0.0.0 No - gsr
```

```

2 0009.11d8.3c66 0.0.0.0 No - gsre

SRR not enabled for Interface SRP0/5/0/0

Rate Limit Information for Interface SRP0/5/0/0
 Minimum SRP priority value of high priority outgoing/transit traffic: 2

```

Fields from the **show srp** command output with the **interface** keyword are described in [Table 92: show srp ips Command Output Fields, on page 1025](#) and [Table 93: show srp topology Command Output Fields, on page 1026](#). The minimum SRP priority value for high-priority traffic is set to 2 by default.

The following example shows the display from the **show srp** command with the **ips** keyword:

```

RP/0/RP0/CPU0:router# show srp ips

IPS Information for Interface SRP0/7/0/0
MAC Addresses
 Side A (Outer ring RX) neighbor 000e.3900.4800
 Side B (Inner ring RX) neighbor 000a.8b08.9600
 Node MAC address 0800.453c.f882
IPS State
 Side A not wrapped
 Side B not wrapped
 Side A (Inner ring TX) IPS pkt. sent every 1 sec. (next pkt. after 1 sec.)
 Side B (Outer ring TX) IPS pkt. sent every 1 sec. (next pkt. after 1 sec.)
 inter card bus disabled
 IPS WTR period is 60 sec. (timer is inactive)
 Node IPS State: idle
IPS Self Detected Requests IPS Remote Requests
 Side A IDLE Side A IDLE
 Side B IDLE Side B IDLE
 Side A Failures: none
 Side B Failures: none
IPS messages received
 Side A (Outer ring RX) { 000e.3900.4800,IDLE,SHORT}, TTL 255
 Side B (Inner ring RX) { 000a.8b08.9600,IDLE,SHORT}, TTL 255
IPS messages transmitted
 Side A (Inner ring TX) { 0800.453c.f882,IDLE,SHORT}, TTL 255
 Side B (Outer ring TX) { 0800.453c.f882,IDLE,SHORT}, TTL 255
IPS delay trigger keepalive
 Side A: 0 milliseconds
 Side B: 0 milliseconds

```

**Table 92: show srp ips Command Output Fields**

| Field                                            | Description                                                                                                                              |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| IPS Information for Interface                    | IPS (Intelligent Protection Switching) identifies the status of an SRP interface on the SRP ring.                                        |
| MAC AddressesSide A (Outer ring RX) neighbor     | MAC address of the next SRP node on the outer ring.                                                                                      |
| MAC AddressesSide B (Inner ring RX) neighbor     | MAC address of the next SRP node on the inner ring.                                                                                      |
| Node MAC address                                 | MAC address of this SRP node.                                                                                                            |
| IPS State                                        | Reports whether or not a wrap exists on side A or side B of the SRP ring.                                                                |
| IPS WTR period is 60 seconds (timer is inactive) | Displays the current WTR (Wait to Restore) timer value. If a timer is active, the time remaining before the timer expires also is given. |

| Field                       | Description                                                                                                                                                                                                                           |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Node IPS State IDLE         | Displays the current IPS state of the node. IDLE is the normal state. Other states are WRAPPED and UNKNOWN. Unknown means that the node is in pass-through mode.                                                                      |
| IPS self-detected requests  | Indicates any locally generated requests. Displays local IPS requests, as well as IDLE status. Possible requests include the following:FS — Forced SwitchSF — Signal FailSD — Signal DegradeMS — Manual SwitchWTR — Wait to Restore   |
| IPS remote requests         | Indicates any remotely generated requests. Displays remote IPS requests, as well as IDLE status. Possible requests include the following:FS — Forced SwitchSF — Signal FailSD — Signal DegradeMS — Manual SwitchWTR — Wait to Restore |
| IPS messages received       | Provides details of the last IPS messages received. Fields within the braces ({} ) are the MAC addresses of the sending node and the IPS state (IDLE, FS, and so on). It also indicates either a short or long path.                  |
| IPS messages transmitted    | Provides details of the last IPS messages transmitted, in the format used for received messages.                                                                                                                                      |
| IPS delay trigger keepalive | Configured value of the <b>srp ips delay trigger-keepalive</b> command. The default value is 0.                                                                                                                                       |

The following example shows the display from the **show srp** command with the **topology** keyword:

```
RP/0/RP0/CPU0:router# show srp topology

Topology Map for Interface SRP0/7/0/0
Topology pkt. sent every 5 sec. (next pkt. after 5 sec.)
Last received topology pkt. 00:00:01
Last topology change was 00:09:44 ago.
Nodes on the ring: 3
Hops (outer ring) MAC IP Address Wrapped SRR Name
0 0800.453c.f882 30.30.30.2 No - crsl
1 000a.8b08.9600 30.30.30.1 No - gsra
2 000e.3900.4800 30.30.30.3 No - gsrb
```

[Table 93: show srp topology Command Output Fields, on page 1026](#) describes the significant fields shown in the display.

**Table 93: show srp topology Command Output Fields**

| Field                      | Description                                                          |
|----------------------------|----------------------------------------------------------------------|
| Topology map for interface | Displays SRP topology information that identifies the SRP interface. |

| Field                                                               | Description                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topology packet sent every 10 seconds (next packet after 5 seconds) | Displays the interval between successive topology packets sent from this node and the time until the next one is to be sent (rounded down to the nearest second).                                                                                                                                                                                                                   |
| Last received topology packet 00:00:04                              | Displays the time since the last topology packet was received at this node.                                                                                                                                                                                                                                                                                                         |
| Nodes on the ring: 4                                                | Displays the number of nodes in the current ring topology.                                                                                                                                                                                                                                                                                                                          |
| Hops                                                                | Displays the number of hops to the destination node along the outer ring (from side B). The local node is at hop count zero.                                                                                                                                                                                                                                                        |
| MAC                                                                 | Displays the MAC address of the node.                                                                                                                                                                                                                                                                                                                                               |
| IP Address                                                          | <p>Displays the IP address of the SRP interface on the node. If the address is not known, the text string “unknown” is displayed.</p> <p>The IP address information is gathered by the ARP table. When a ring is first established, it is normal for the IP address of a node to remain unknown until some time after the MAC address is known.</p>                                 |
| Wrapped                                                             | Uses Yes or No to indicate whether the SRP ring is wrapped at that node.                                                                                                                                                                                                                                                                                                            |
| SRR                                                                 | Indicates whether SRR is enabled on the node.                                                                                                                                                                                                                                                                                                                                       |
| Name                                                                | <p>Displays the hostname of the router. If the name is not known, this field is left blank.</p> <p>The hostname is obtained from information that is broadcast on the ring at a slower rate than other topology information. When a ring is first established, it is normal for the hostname of a remote node to remain unknown until some time after the MAC address is known.</p> |

The following example shows the display from the **show srp** command with the **transit** keyword:

```
RP/0/RP0/CPU0:router# show srp transit interface srp 0/7/0/0

Transit Buffer Delay Counters for Interface SRP0/7/0/0
Side A:
Transit Delay (5 Minutes) Nanoseconds
Low TB Min Delay: 0
Low TB Avg Delay: 0
Low TB Max Delay: 0
```

```

High TB Min Delay: 569
High TB Avg Delay: 569
High TB Max Delay: 570

Side B:
Transit Delay (5 Minutes) Nanoseconds
Low TB Min Delay: 0
Low TB Avg Delay: 0
Low TB Max Delay: 0
High TB Min Delay: 15
High TB Avg Delay: 261
High TB Max Delay: 574

```

**Table 94: show srp transit Command Output Fields**

| Field             | Description                                                                          |
|-------------------|--------------------------------------------------------------------------------------|
| Low TB Min Delay  | Minimum value for the low transit buffer as calculated over the last load interval.  |
| Low TB Avg Delay  | Average value for the low transit buffer as calculated over the last load interval.  |
| Low TB Max Delay  | Maximum value for the low transit buffer as calculated over the last load interval.  |
| High TB Min Delay | Minimum value for the high transit buffer as calculated over the last load interval. |
| High TB Avg Delay | Average value for the high transit buffer as calculated over the last load interval. |
| High TB Max Delay | Maximum value for the high transit buffer as calculated over the last load interval. |

**Related Commands**

| Command                                            | Description                                                                   |
|----------------------------------------------------|-------------------------------------------------------------------------------|
| <a href="#">clear srp counters, on page 1006</a>   | Clears the various SRP packet counters.                                       |
| <b>load-interval</b>                               | Sets the time (in seconds) used to gather data for computing load statistics. |
| <b>show controllers sonet</b>                      | Displays the SONET controller information for the interface.                  |
| <a href="#">show controllers srp, on page 1015</a> | Displays the current controller configuration on an SRP interface.            |
| <b>show interfaces srp</b>                         | Displays current IPS wrap state, along with other SRP interface information.  |



# srp ips delay trigger-keepalive

To specify a delay for the IPS keepalive value, use the **srp ips delay keep-alive** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**srp ips delay trigger-keepalive** *value* {a| b}

**no srp ips delay trigger-keepalive** *value* {a| b}

## Syntax Description

|              |                                                                                 |
|--------------|---------------------------------------------------------------------------------|
| <i>value</i> | Time in milliseconds of the trigger keepalive. Values can range from 51 to 200. |
| <b>a</b>     | The side of a node that has outer ring receive fiber is identified as side A.   |
| <b>b</b>     | The side of a node that has inner ring receive fiber is identified as side B.   |

## Command Default

The default IPS keepalive delay value is 0.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The default keepalive value is 1 ms. Use the **srp ips delay trigger-keepalive** command to delay this 1 ms up to the configured delay value. You should use this command only if the Layer 1 (SONET) is already protected (for example, with SONET APS). This delay gives the first protection mechanism time to protect, before the Layer 2 protection is enabled. For example, if an SRP side is connected to an Add-Drop Multiplexer (ADM) that utilizes dual SONET ring and APS, you should delay the Layer 2 keepalive value using this command.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

Examples

The following example indicates how to set the trigger keepalive timer to 60 milliseconds:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp ips delay trigger-keepalive 60 a
```

Related Commands

| Command                                | Description                                  |
|----------------------------------------|----------------------------------------------|
| <a href="#">show srp, on page 1017</a> | Displays information about an SRP interface. |

# srp ips request forced-switch

To initiate a forced-switch wrap on a ring, use the **srp ips request forced-switch** command in interface configuration mode. To remove the wrap, use the **no** form of this command.

**srp ips request forced-switch {a| b}**

**no srp ips request forced-switch {a| b}**

## Syntax Description

|          |                                                                               |
|----------|-------------------------------------------------------------------------------|
| <b>a</b> | The side of a node that has outer ring receive fiber is identified as side A. |
| <b>b</b> | The side of a node that has inner ring receive fiber is identified as side B. |

## Command Default

No default behavior or values

## Command Modes

Interface configuration

## Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

## Examples

The following example shows how to insert a forced-switch wrap on side A of the interface by entering the **srp ips request forced-switch** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
```

```
RP/0/RP0/CPU0:router(config-if)# srp ips request forced-switch a
```

### Related Commands

| Command                                         | Description                                                                                                                                         |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>show interfaces srp</b>                      | Displays current IPS wrap state, along with other SRP interface information.                                                                        |
| <a href="#">show srp, on page 1017</a>          | Displays information about SRP interfaces on the ring, including MAC addresses of neighboring nodes, IPS status, source-counters, and topology map. |
| <a href="#">srp ips wtr-timer, on page 1035</a> | Determines how long a wrap remains on the fiber after the original cause of the wrap is removed.                                                    |
| <a href="#">srp manual-switch, on page 1041</a> | Inserts a manual-switch wrap on the ring.                                                                                                           |
| <a href="#">srp shutdown, on page 1045</a>      | Provides an alternative form of the <b>srp ips request forced-switch</b> command.                                                                   |

## srp ips timer

To control the frequency of the transmission of Intelligent Protection Switching (IPS) requests, use the **srp ips timer** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**srp ips timer** *value*

**no srp ips timer** *value*

### Syntax Description

|              |                                                                                                |
|--------------|------------------------------------------------------------------------------------------------|
| <i>value</i> | Amount of time in seconds between transmission of IPS requests. Values can range from 1 to 60. |
|--------------|------------------------------------------------------------------------------------------------|

### Command Default

The default IPS timer value is 1 second.

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

In general, you should not need to adjust the IPS timer value.

We recommend that you configure the same IPS timer value on all nodes on an SRP ring. This means that if you modify the IPS timer setting on one node, you must reconfigure all other nodes on the ring with the same IPS timer value.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

Examples

The following example indicates how to change the IPS timer to 30 seconds:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp ips timer 30
```

Related Commands

| Command                                         | Description                                                                                              |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <a href="#">show srp, on page 1017</a>          | Displays information about an SRP interface.                                                             |
| <a href="#">srp ips wtr-timer, on page 1035</a> | Controls the amount of time to wait before a wrap is removed after there is no more reason for the wrap. |

## srp ips wtr-timer

To control the amount of time to wait before a wrap is removed after there is no more reason for the wrap, use the **srp ips wtr-timer** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**srp ips wtr-timer** *value*

**no srp ips wtr-timer** *value*

### Syntax Description

|              |                                                                                                 |
|--------------|-------------------------------------------------------------------------------------------------|
| <i>value</i> | Amount of time in seconds for the wait-to-restore (WTR) timer. Values can range from 10 to 600. |
|--------------|-------------------------------------------------------------------------------------------------|

### Command Default

The default WTR timer value is 60 seconds.

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

In general, you should not need to adjust the Intelligent Protection Switching (IPS) wait-to-restore (WTR) timer value.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

### Examples

The following example indicates how to change the IPS wait-to-restore timer to 120 seconds:

```
RP/0/RP0/CPU0:router# config
```

```
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp ips wtr-timer 120
```

Related Commands

| Command                                     | Description                                                 |
|---------------------------------------------|-------------------------------------------------------------|
| <a href="#">show srp, on page 1017</a>      | Displays information about an SRP interface.                |
| <a href="#">srp ips timer, on page 1033</a> | Controls the frequency of the transmission of IPS requests. |



## srp mac-count

To keep track of the number of SRP packets from a specific source MAC address, use the **srp mac-count** command in interface configuration mode. To disable counting by MAC address, use the **no** form of this command.

**srp mac-count** *mac-address*

**no srp mac-count** *mac-address*

### Syntax Description

|                    |                                                            |
|--------------------|------------------------------------------------------------|
| <i>mac-address</i> | 48-bit source MAC address from which to count SRP packets. |
|--------------------|------------------------------------------------------------|

### Command Default

The **srp mac-count** command is disabled by default.

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

### Examples

The following example shows how to count SRP packets from the source with MAC address 2.2.2:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp mac-count 2.2.2
```

Related Commands

| Command                                          | Description                                  |
|--------------------------------------------------|----------------------------------------------|
| <a href="#">clear srp counters, on page 1006</a> | Clears the SRP counters.                     |
| <a href="#">show srp, on page 1017</a>           | Displays information about an SRP interface. |

## srp mac-reject

To reject SRP packets from a specific source MAC address, use the **srp mac-reject** command in interface configuration mode. To disable rejection by MAC address, use the **no** form of this command.

**srp mac-reject** *mac-address*

**no srp mac-reject** *mac-address*

### Syntax Description

|                    |                                                             |
|--------------------|-------------------------------------------------------------|
| <i>mac-address</i> | 48-bit source MAC address from which to reject SRP packets. |
|--------------------|-------------------------------------------------------------|

### Command Default

The **srp mac-reject** command is disabled by default.

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                                             |
|---------------|------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.             |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use **srp mac-reject** command to control a node that cannot be fixed because it is owned or administered by someone else. For example, if such a node is flooding your node with packets, you can use this command to limit the amount of traffic that is processed.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

### Examples

The following example shows how to reject SRP packets from the source with MAC address 2.2.2:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp mac-reject 2.2.2
```

Related Commands

| Command                                          | Description                                  |
|--------------------------------------------------|----------------------------------------------|
| <a href="#">clear srp counters, on page 1006</a> | Clears the SRP counters.                     |
| <a href="#">show srp, on page 1017</a>           | Displays information about an SRP interface. |

# srp manual-switch

To initiate or remove a manual switch wrap on a ring, use the **srp manual-switch** command in EXEC mode.

**srp {request| remove} manual-switch {a| b} interface srp interface-path-id**

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>request</b>           | Initiate a manual switch wrap on the interface.                                                                                                                                                                                                                                 |
| <b>remove</b>            | Remove a manual switch wrap on the interface.                                                                                                                                                                                                                                   |
| <b>a</b>                 | The side of a node that has outer ring receive fiber is identified as side A.                                                                                                                                                                                                   |
| <b>b</b>                 | The side of a node that has inner ring receive fiber is identified as side B.                                                                                                                                                                                                   |
| <b>interface</b>         | Specifies the interface for which to display the counters.                                                                                                                                                                                                                      |
| <b>srp</b>               | Specifies an SRP interface.                                                                                                                                                                                                                                                     |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

Examples

The following example shows how to insert a manual switch wrap on side A of the interface:

```
RP/0/RP0/CPU0:router# srp request manual-switch a interface srp 0/5/0/0
```

Related Commands

| Command                                                     | Description                                                                                                                                         |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>show interfaces srp</b>                                  | Displays current IPS wrap state, along with other SRP interface information.                                                                        |
| <a href="#">show srp, on page 1017</a>                      | Displays information about SRP interfaces on the ring, including MAC addresses of neighboring nodes, IPS status, source-counters, and topology map. |
| <a href="#">srp ips request forced-switch, on page 1031</a> | Inserts a forced switch wrap on the ring; this command is an alternate form of the <b>srp shutdown</b> command.                                     |
| <a href="#">srp ips wtr-timer, on page 1035</a>             | Determines how long a wrap remains on the fiber after the original cause of the wrap is removed.                                                    |
| <a href="#">srp shutdown, on page 1045</a>                  | Provides an alternative form of the <b>srp ips request forced-switch</b> command.                                                                   |

## srp priority-threshold

To specify the RAC threshold for placing packets in the high-priority queue, use the **srp priority-threshold** command in Interface configuration mode. To return the priority threshold to its default value, use the **no** form of this command.

**srp priority-threshold** [*RAC-threshold*] **non-high**

**no srp priority-threshold** [*RAC-threshold*] **non-high**

### Syntax Description

|                      |                                                                               |
|----------------------|-------------------------------------------------------------------------------|
| <i>RAC-threshold</i> | RAC priority slicing point threshold ranging from 1 to 7.                     |
| <b>non-high</b>      | Specifies not to place any packets into the RAC high priority transmit queue. |

### Command Default

No default behavior or values

### Command Modes

Interface configuration

### Command History

| Release | Modification                 |
|---------|------------------------------|
| 3.2.2   | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Examples

The following example shows how to qualify traffic with a RAC of 5 or greater into the high-priority transmit queue:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp priority-threshold 5
```

### Related Commands

| Command                                                 | Description                                  |
|---------------------------------------------------------|----------------------------------------------|
| <a href="#">show srp</a> , <a href="#">on page 1017</a> | Displays information about an SRP interface. |

## srp rate-limit

To configure the amount of high- and low-priority traffic being transmitted from the router onto the SRP ring, use the **srp rate-limit** command in Interface configuration mode. To disable rate limiting, use the **no** form of this command.

**rate-limit** [**high**|**low**] *limit*

**no rate-limit** [**high**|**low**] *limit*

### Syntax Description

|              |                                                                  |
|--------------|------------------------------------------------------------------|
| <b>high</b>  | Specifies the SRP high priority transmit queue rate limit.       |
| <b>low</b>   | Specifies the SRP low priority transmit queue rate limit.        |
| <b>limit</b> | Rate limit in Mbps. The value can range from 0 to 4,294,967,295. |

### Command Default

No default behavior or values

### Command Modes

Interface configuration

### Command History

| Release | Modification                 |
|---------|------------------------------|
| 3.2.2   | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Examples

The following example shows how to limit the traffic in the high and low priority traffic to the SRP ring:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp rate-limit high 622
RP/0/RP0/CPU0:router(config-if)# srp rate-limit low 1866
```

### Related Commands

| Command                                                 | Description                                  |
|---------------------------------------------------------|----------------------------------------------|
| <a href="#">show srp</a> , <a href="#">on page 1017</a> | Displays information about an SRP interface. |



# srp shutdown

To shut down an interface by entering a forced switch, use the **srp shutdown** command in interface configuration mode. To remove the forced switch wrap near the interface, use the **no** form of this command.

**srp shutdown**

**no srp shutdown**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** Interface configuration

| Command History | Release       | Modification                                                                                  |
|-----------------|---------------|-----------------------------------------------------------------------------------------------|
|                 | Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
|                 | Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | pos-dpt | read, write |

**Examples** The following example shows how to enter a forced switch on the interface:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
RP/0/RP0/CPU0:router(config-if)# srp shutdown
```

**Related Commands**

| Command                                                     | Description                                                                                                                                         |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>show interfaces srp</b>                                  | Displays current IPS wrap state along with other SRP interface information.                                                                         |
| <a href="#">show srp, on page 1017</a>                      | Displays information about SRP interfaces on the ring, including MAC addresses of neighboring nodes, IPS status, source-counters, and topology map. |
| <a href="#">srp ips request forced-switch, on page 1031</a> | Inserts a forced switch wrap on the ring; this command is an alternate form of the <b>srp shutdown</b> command.                                     |

## srp topology-timer

To specify the frequency of the topology timer, use the **srp topology-timer** command in interface configuration mode. To restore the default value, use the **no** form of this command.

**srp topology-timer** *value*

**no srp topology-timer** *value*

### Syntax Description

|              |                                                            |
|--------------|------------------------------------------------------------|
| <i>value</i> | Value of topology timer in seconds, ranging from 1 to 600. |
|--------------|------------------------------------------------------------|

### Command Default

The default topology timer value is 10 seconds.

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                                                  |
|---------------|-----------------------------------------------------------------------------------------------|
| Release 3.2.2 | This command was introduced and is supported only on the 4-port OC-192c/STM-64c POS/DPT PLIM. |
| Release 3.4.0 | This command was first supported on the 16-port OC-48c/STM-16c POS/DPT PLIM.                  |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **srp topology-timer** interface configuration command determines how frequently topology discovery messages are sent around the ring to identify the current nodes on the SRP ring.

In general, you should not need to adjust the topology timer value.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| pos-dpt | read, write |

### Examples

The following example indicates how to change the topology timer to 300 seconds:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface srp 0/5/0/0
```

RP/0/RP0/CPU0:router(config-if)# **srp topology-timer 1**

Related Commands

| Command                                | Description                                  |
|----------------------------------------|----------------------------------------------|
| <a href="#">show srp, on page 1017</a> | Displays information about an SRP interface. |



## T3 and E3 Controller Commands on the Cisco IOS XR Software

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This module provides command line interface (CLI) commands for configuring T3/E3 controllers on the Cisco CRS Router.

- [bert e3, page 1051](#)
- [bert error, page 1053](#)
- [bert interval, page 1055](#)
- [bert pattern, page 1057](#)
- [bert t3, page 1059](#)
- [cablelength, page 1061](#)
- [clear controller t3, page 1062](#)
- [clock source \(T3/E3\), page 1064](#)
- [controller e3, page 1066](#)
- [controller t3, page 1068](#)
- [delay clear \(T3/E3\), page 1070](#)
- [delay trigger \(T3/E3\), page 1072](#)
- [description \(T3/E3\), page 1074](#)
- [down-when-looped \(T3/E3\), page 1076](#)
- [dsu bandwidth, page 1078](#)
- [dsu mode, page 1080](#)
- [dsu remote, page 1082](#)
- [framing \(E3\), page 1084](#)
- [framing \(T3\), page 1086](#)
- [hw-module subslot cardtype, page 1088](#)
- [loopback \(T3/E3\), page 1090](#)

- [mdl](#), page 1092
- [mode](#), page 1094
- [national bits \(E3\)](#), page 1096
- [show controllers e3](#), page 1098
- [show controllers t3](#), page 1102
- [shutdown \(T3/E3\)](#), page 1111

# bert e3

To start or stop a configured bit error rate test (BERT) on an E3 controller or channel group, use the **bert e3** command in EXEC mode. To return to the default state, use the **no** form of this command.

**bert e3** *interface-path-id* [**error**] {**start**|**stop**}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>error</b>             | (Optional) Injects errors into the running BERT stream.                                                                                                                                                                                                                         |
| <b>start</b>             | Starts the BERT on the E3 controller or channel.                                                                                                                                                                                                                                |
| <b>stop</b>              | Stops the BERT on the E3 controller or channel.                                                                                                                                                                                                                                 |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.5.0 | This command was introduced for T3/E3 lines. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.

- If specifying a virtual interface, the number range varies, depending on interface type.

**Note**

Before you can start a BERT on an E3 controller, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in E3 configuration mode.

To view the BERT results, use the **show controllers e3** command in EXEC mode. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to start and stop a BERT on an E3 controller:

```
RP/0/RP0/CPU0:router# bert e3 0/3/0/0/0 start
RP/0/RP0/CPU0:router# bert e3 0/3/0/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an E3 controller:

```
RP/0/RP0/CPU0:router# bert e3 0/3/0/0 error
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert interval, on page 1055</a>       | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 line.                  |
| <a href="#">bert pattern, on page 1057</a>        | Enables a BERT pattern on a T3/E3 line or an individual channel group.                           |
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |



# bert error

To insert errors into a BERT stream on a T3/E3 line, use the **bert error** command in T3 configuration mode. To disable a BERT pattern, use the **no** form of this command.

**bert error** [ *number* ]

**no bert error** [ *number* ]

## Syntax Description

|               |                                                                                                                     |
|---------------|---------------------------------------------------------------------------------------------------------------------|
| <i>number</i> | Specifies the number of BERT errors to introduce into the bit stream. The range is from 1 to 255. The default is 1. |
|---------------|---------------------------------------------------------------------------------------------------------------------|

## Command Default

The default is 1.

## Command Modes

T3 configuration  
E3 configuration

## Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.5.0 | This command was introduced for T3/E3 lines. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **bert error** command with the **bert pattern** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to insert 10 errors into the BERT bit stream on the T3 controller in slot 0, subslot 3:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RP0/CPU0:router(config-t3e3)# bert error 10
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert interval, on page 1055</a>       | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 line.                  |
| <a href="#">bert pattern, on page 1057</a>        | Enables a BERT pattern on a T3/E3 line or an individual channel group.                           |
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## bert interval

To specify the duration of a bit error rate test (BERT) pattern on a T3/E3 line, use the **bert interval** command in the appropriate configuration mode. To revert to the default interval, use the **no** form of this command.

**bert interval** *time*

**no bert interval** *time*

### Syntax Description

|             |                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------|
| <i>time</i> | Duration (in minutes) of the BERT. The interval can be a value from 1 to 14400. The default is 1 minute. |
|-------------|----------------------------------------------------------------------------------------------------------|

### Command Default

A BERT runs for 1 minute.

### Command Modes

T3 configuration

E3 configuration

### Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.5.0 | This command was introduced for T3/E3 lines. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **bert interval** command with the **bert pattern** command. If the **bert interval** command is not used, then the BERT runs for a default of 1 minute.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to limit the BERT to 10 minutes on the T3 controller in slot 0, subslot 3:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RP0/CPU0:router(config-t3e3)# bert interval 10
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert error, on page 1053</a>          | Insert errors into a BERT stream on a T3/E3 line.                                                |
| <a href="#">bert pattern, on page 1057</a>        | Enables a BERT pattern on a T3/E3 line or an individual channel group.                           |
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# bert pattern

To enable a bit error rate test (BERT) pattern on a T3/E3 line or an individual channel group, use the **bert pattern** command in T3 or E3 configuration mode. To disable a BERT pattern, use the **no** form of this command.

**bert pattern** {0s| 1s| 2^11| 2^15| 2^20| 2^20-QRSS| 2^23| 2^9}

**no bert pattern** {0s| 1s| 2^11| 2^15| 2^20| 2^20-QRSS| 2^23| 2^9}

## Syntax Description

|                  |                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>0s</b>        | Invokes a repeating pattern of zeros (...000...).                                                               |
| <b>1s</b>        | Invokes a repeating pattern of ones (...111...).                                                                |
| <b>2^11</b>      | (Channel group only) Invokes a pseudorandom O.151 test pattern that is 32,768 bits in length.                   |
| <b>2^15</b>      | Invokes a pseudorandom O.151 test pattern that is 32,768 bits in length.                                        |
| <b>2^20</b>      | Invokes a pseudorandom O.153 test pattern that is 1,048,575 bits in length.                                     |
| <b>2^20-QRSS</b> | Invokes a pseudorandom quasi-random signal sequence (QRSS) 0.151 test pattern that is 1,048,575 bits in length. |
| <b>2^23</b>      | Invokes a pseudorandom O.151 test pattern that is 8,388,607 bits in length.                                     |
| <b>2^9</b>       | (Channel group only) Invokes a pseudorandom 0.153 test pattern of 511 bits in length.                           |
| <b>alt-0-1</b>   | Invokes a repeating pattern of alternating zeros and ones (...01010...).                                        |

## Command Default

BERT pattern test is disabled

## Command Modes

T3 configuration  
E3 configuration

## Command History

| Release       | Modification                                                                                                                                                                    |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.5.0 | This command was introduced.                                                                                                                                                    |
| Release 3.6.0 | The <b>1in8</b> , <b>2^11</b> , <b>2^9</b> , <b>3in24</b> , <b>55Daly</b> , <b>55Octet</b> , <b>ds0-1</b> , <b>ds0-2</b> , <b>ds0-3</b> , and <b>ds0-4</b> keywords were added. |
| Release 3.7.0 | The <b>none</b> keyword was removed.                                                                                                                                            |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

BERT is supported on each of the T3/E3 links. It is done only over an unframed T3/E3 signal and is run on only one port at a time. It is also supported on an individual channel group.

To begin a BERT, commit the configuration and use the **bert t3** or **bert e3** command in EXEC mode.

To view the BERT results, use the **show controllers t3** command in EXEC mode. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to enable the running of a BERT pattern of all zeros on the T3 controller in slot 0, subslot 3:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RP0/CPU0:router(config-t3e3)# bert pattern 0s
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert error, on page 1053</a>          | Insert errors into a BERT stream on a T3/E3 line.                                                |
| <a href="#">bert interval, on page 1055</a>       | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 line.                  |
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# bert t3

To start or stop a configured bit error rate test (BERT) on a T3 controller or channel group, use the **bert t3** command in EXEC mode.

**bert t3** *interface-path-id* [**error**] {**start**|**stop**}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>error</b>             | (Optional) Injects errors into the running BERT stream.                                                                                                                                                                                                                         |
| <b>start</b>             | Starts the BERT on the T3 controller or channel.                                                                                                                                                                                                                                |
| <b>stop</b>              | Stops the BERT on the T3 controller or channel.                                                                                                                                                                                                                                 |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.

- If specifying a virtual interface, the number range varies, depending on interface type.

**Note**

Before you can start a BERT on a T3 controller, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in T3 configuration mode.

To view the BERT results, use the **show controllers t3** command in EXEC mode. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to start and stop a BERT on a T3 controller:

```
RP/0/RP0/CPU0:router# bert t3 0/3/0/0 start
RP/0/RP0/CPU0:router# bert t3 0/3/0/0 stop
```

The following example shows how to inject errors into the BERT stream on a T3 controller:

```
RP/0/RP0/CPU0:router# bert t3 0/3/0/0 error
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert interval, on page 1055</a>       | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 line.                  |
| <a href="#">bert pattern, on page 1057</a>        | Enables a BERT pattern on a T3/E3 line or an individual channel group.                           |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |



# cablelength

To specify the distance of the cable from the routers to the network equipment, use the **cablelength** command in T3 or E3 configuration mode. To restore the default cable length, use the **no** form of this command.

**cablelength** *feet*

**no cablelength**

| Syntax Description | <i>feet</i> Number of feet in the range from 0 to 450. The default is 224 feet. |
|--------------------|---------------------------------------------------------------------------------|
|--------------------|---------------------------------------------------------------------------------|

| Command Default | The default is 224 feet. |
|-----------------|--------------------------|
|-----------------|--------------------------|

| Command Modes | T3 configuration<br>E3 configuration |
|---------------|--------------------------------------|
|---------------|--------------------------------------|

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.5.0 | This command was introduced. |

| Usage Guidelines | <p>To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.</p> <p>You can specify a cable length from 0 to 450 feet; however, the hardware recognizes only two ranges: 0 to 49 and 50 to 450. For example, entering 35 feet uses the 0 to 49 range. If you later change the cable length to 40 feet, there is no change because 40 is still within the 0 to 49 range. However, if you change the cable length to 50, the 50 to 450 range is used. The actual number you enter is stored in the configuration file.</p> |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

| Examples | The following example shows how to set the cable length for the router to 300 feet: |
|----------|-------------------------------------------------------------------------------------|
|----------|-------------------------------------------------------------------------------------|

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RP0/CPU0:router(config-t3)# cablelength 300
```

## clear controller t3

To clear T3 controller data, use the **clear controller t3** command in EXEC configuration mode.

**clear controller t3** *interface-path-id*

### Syntax Description

|                                                                                                                                                                                                                                   |                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <i>interface-path-id</i>                                                                                                                                                                                                          | Physical interface or virtual interface. |
| <b>Note</b> Use the <b>show controllers</b> command to see a list of all controllers currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |                                          |

### Command Default

No default behavior or values

### Command Modes

EXEC

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- When specifying a T3 controller, the naming notation is *rack/slot/module/port/T3num*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - rack*—Chassis number of the rack.
  - slot*—Physical slot number of the line card or SIP.
  - module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - port*—Physical port number of the interface.
  - T3num*—T3 controller number.

To view the status of the controllers, use the **show controllers t3** command.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| dwdm      | read, write |
| interface | read, write |
| sonet-sdh | read, write |

**Examples**

The following example shows how to clear controller data for T3 controller 1 that is located in chassis 0, for a SIP installed in slot 6 with a SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/2/0/1
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">controller t3, on page 1068</a>       | Configures a T3 controller and enters T3 configuration mode.                                     |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## clock source (T3/E3)

To set clocking for individual T3 or E3 links, use the **clock source** command in T3 or E3 configuration mode. To return to the default, use the **no** form of this command.

**clock source** {**internal**| **line**}

**no clock source**

### Syntax Description

|                 |                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>internal</b> | Specifies that the clock is generated from the internal clock of the T3 or E3 controller. The default is internal.                                                                                                                                                                                                                |
| <b>Note</b>     | When configuring clocking on a serial link, you need to configure one end to be <b>internal</b> and the other end to be <b>line</b> . If you configure <b>internal</b> clocking on both ends of a connection, framing slips occur. If you configure <b>line</b> clocking on both ends of a connection, the line does not come up. |
| <b>line</b>     | Specifies that the clock on this controller derives its clocking from the external source to which the controller is connected, which is generally the telephone company central office (CO).                                                                                                                                     |

### Command Default

The default clock source is internal.

### Command Modes

T3 configuration  
E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you do not specify the **clock source** command, the default clock source is used.

Configure the **clock source line** command if your telephone company or the remote data service unit provides the master clock of the T3 or E3 connection.

Configure the **clock source internal** command if your router provides the master clock of the T3 or E3 connection.

**Note**

For a back-to-back connection between two T3 or E3 network modules, one controller must be configured for internal clocking while the other controller must be configured for line clocking.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to set the clocking to line on the T3 controller 1 that is located in chassis 0, on a SIP installed in slot 6 with a SPA in subslot 0, on port 0 with T3 controller 1:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RP0/CPU0:router(config-t3)# clock source line
```

**Related Commands**

| Command                                     | Description                                                   |
|---------------------------------------------|---------------------------------------------------------------|
| <a href="#">controller e3, on page 1066</a> | Configures an E3 controller and enters E3 configuration mode. |
| <a href="#">controller t3, on page 1068</a> | Configures a T3 controller and enters T3 configuration mode.  |

# controller e3

To configure an E3 controller and enter E3 configuration mode, use the **controller e3** command in global configuration mode. To return to the default state, use the **no** form of this command.

**controller e3** *interface-path-id*

**no controller e3** *interface-path-id*

## Syntax Description

|                          |                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.                                                                     |
| <b>Note</b>              | Use the <b>show controllers</b> command to see a list of all controllers currently configured on the router. |
|                          | For more information about the syntax for the router, use the question mark (?) online help function.        |

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

The **controller e3** command applies only to the 2-Port and 4-Port Clear Channel T3/E3 SPAs. Use the **card type** command to define the controller type to be E3.

To view the status of the controllers, use the **show controllers e3** command.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

The following example shows how to enter E3 configuration mode for a controller in slot 6, on the SPA in subslot 2, on E3 controller 0:

```
RP/0/RP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RP0/CPU0:router(config-e3)#
```

**Related Commands**

| Command                                                   | Description                                                                                      |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">hw-module subslot cardtype</a> , on page 1088 | Sets the ports on a SPA in T3 or E3 mode.                                                        |
| <a href="#">show controllers e3</a> , on page 1098        | Displays information about the E3 links and hardware and software drivers for the E3 controller. |

## controller t3

To configure a T3 controller and enter T3 configuration mode, use the **controller t3** command in global configuration mode. To return to the default state, use the **no** form of this command.

**controller t3** *interface-path-id*

**no controller t3** *interface-path-id*

### Syntax Description

|                          |                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.                                                                     |
| <b>Note</b>              | Use the <b>show controllers</b> command to see a list of all controllers currently configured on the router. |
|                          | For more information about the syntax for the router, use the question mark (?) online help function.        |

### Command Default

No default behavior or values

### Command Modes

Global configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- When specifying a T3 controller, the naming notation is *rack/slot/module/port/T3num*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - rack*—Chassis number of the rack.
  - slot*—Physical slot number of the line card or SIP.
  - module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - port*—Physical port number of the interface.
  - T3num*—T3 controller number.



- If specifying a virtual interface, the number range varies, depending on interface type.

For the 2-Port and 4-Port Clear Channel T3/E3 SPAs, use the **card type** command to define the controller type to be T3.

To view the status of the controllers, use the **show controllers t3** command.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

The following example shows how to enter T3 configuration mode for T3 controller 1 that is located in chassis 0, for a SIP installed in slot 6 with a SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RP0/CPU0:router(config-t3)#
```

**Related Commands**

| Command                                                   | Description                                                                                      |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">hw-module subslot cardtype</a> , on page 1088 | Sets the ports on a SPA in T3 or E3 mode.                                                        |
| <a href="#">show controllers t3</a> , on page 1102        | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## delay clear (T3/E3)

To configure the amount of time before a T3 or E3 path delay trigger alarm is cleared, use the **delay clear** command in T3 or E3 configuration mode. To return the command to its default setting, use the **no** form of this command.

**delay clear** *value*

**no delay clear** *value*

### Syntax Description

|              |                                                                                                                                               |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <i>value</i> | Value, in milliseconds, before a T3 or E3 path delay trigger alarm is cleared. The range is from 0 through 180000. The default is 10 seconds. |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

The default is 10 seconds.

### Command Modes

T3 configuration  
E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to specify that T3 path delay trigger alarms should be cleared after 9000 seconds:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RP0/CPU0:router(config-t3)# delay clear 9000
```

**Related Commands**

| Command                                              | Description                                                  |
|------------------------------------------------------|--------------------------------------------------------------|
| <a href="#">delay trigger (T3/E3)</a> , on page 1072 | Configures a time value for the T3 or E3 path delay trigger. |

## delay trigger (T3/E3)

To configure a time value for the T3 or E3 path delay trigger, use the **delay trigger** command in T3 or E3 configuration mode. To return the command to its default setting, use the **no** form of this command.

**delay trigger** *value*

**no delay trigger**

### Syntax Description

|              |                                                                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------------|
| <i>value</i> | Sets the T3 or E3 path delay trigger value, in milliseconds. The range is from 0 through 60000. The default is 2.5 seconds. |
|--------------|-----------------------------------------------------------------------------------------------------------------------------|

### Command Default

The default is 2.5 seconds.

### Command Modes

T3 configuration

E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.8.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If the timer for the T3 or E3 path delay trigger expires, an alarm is declared.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to set the T3 path delay trigger to 8000 milliseconds:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RP0/CPU0:router(config-t3)# delay trigger 8000
```

**Related Commands**

| Command                                           | Description                                                                          |
|---------------------------------------------------|--------------------------------------------------------------------------------------|
| <a href="#">delay clear (T3/E3), on page 1070</a> | Configures the amount of time before a T3 or E3 path delay trigger alarm is cleared. |

## description (T3/E3)

To configure a description for a T3 or E3 controller, use the **description** command in T3 or E3 configuration mode. To delete a T3 or E3 controller description, use the **no** form of this command.

**description** *text*

**no description** [ *text* ]

### Syntax Description

|             |                                                     |
|-------------|-----------------------------------------------------|
| <i>text</i> | A text string comprised of alphanumeric characters. |
|-------------|-----------------------------------------------------|

### Command Default

No description is configured.

### Command Modes

T3 configuration  
E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |
| interface | read, write |

### Examples

The following example shows how to configure a description for a T3 controller:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/2/0
RP/0/RP0/CPU0:router(config-t3)# description This is a sample description for T3 controller
0/6/2/0
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## down-when-looped (T3/E3)

To configure a T3 or E3 controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in T3 or E3 configuration mode.

### down-when-looped

#### Syntax Description

This command has no keywords or arguments.

#### Command Default

By default, a T3 or E3 controller does not inform the system that it is down when loopback is detected.

#### Command Modes

T3 configuration  
E3 configuration

#### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.6.0 | This command was introduced. |

#### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

This command does not have a **no** form.

#### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |
| interface | read, write |

#### Examples

The following example shows how to configure a T3 controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/4/2/0
RP/0/RP0/CPU0:router(config-t3)# down-when-looped
```

down-when-looped is a traffic-affecting operation if any loopback is present



**Related Commands**

| Command                                        | Description                                                           |
|------------------------------------------------|-----------------------------------------------------------------------|
| <a href="#">loopback (T3/E3), on page 1090</a> | Loops the entire T3 or E3 line on the T3 controller or E3 controller. |

## dsu bandwidth

To specify the maximum allowable bandwidth used by a T3 or an E3 controller, use the **dsu bandwidth** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

**dsu bandwidth kbps**

**no dsu bandwidth**

| Syntax Description |                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------|
| <i>kbps</i>        | Maximum bandwidth, in kilobits per second (kbps). Range is from 75 to 44210. The default is 44210. |

| Command Default | The default bandwidth is 44210. |
|-----------------|---------------------------------|
|-----------------|---------------------------------|

| Command Modes | T3 configuration<br>E3 configuration |
|---------------|--------------------------------------|
|---------------|--------------------------------------|

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.5.0 | This command was introduced. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The local interface configuration must match the remote interface configuration. For example, if you reduce the maximum bandwidth to 16,000 on the local port, you must also do the same on the remote port.

The **dsu bandwidth** command reduces the bandwidth by padding the E3 and T3 frame.

To verify the data service unit (DSU) bandwidth configured on the interface, use the **show controllers t3** or **show controllers e3** command in EXEC mode.

When G.751 framing is used on E3 links, DSU bandwidth can be used to select a payload subrate from 34,010 kbps down to 22 kbps. Before framing bypass can be used, a DSU bandwidth of 34,010 kbps must be configured.

Although software allows the user to configure a continuous range of bandwidths in subrate modes, vendors support bandwidths only in quantums (for example, in a ADC Kentrox T3 link, bandwidth must be in multiples of 500 kbps). Therefore, the software sets the user-configured bandwidth to the closest vendor-supported bandwidth. Use the **show controllers t3** or **show controllers e3** command to display the actual bandwidth that is configured.

The following table shows DSU modes and vendor-supported bandwidths.

**Table 95: DSU Modes and Vendor-supported Bandwidths**

| Mode                   | Bandwidth (in kbps)                | Bandwidth Multiples (in kbps) |
|------------------------|------------------------------------|-------------------------------|
| Digital Link or Cisco  | 358–34010 for E3300–44210 for T3   | 358 300.746                   |
| ADC Kentrox T3/E3 IDSU | 1000–34010 for E31500–44210 for T3 | 500 500                       |
| Larscom Access T45     | 3100–44210 kbps                    | 3158                          |
| Adtran T3SU 300        | 75–44210 kbps                      | 75.186                        |
| Verilink HDM 2182      | 1500–44210 kbps                    | 1579                          |

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to set the maximum allowable DSU bandwidth to 16,000 kbps on a SIP in slot 6, on the SPA in subslot 2, for port 0, and T3 controller 1:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RP0/CPU0:router(config-t3)# dsu bandwidth 16000
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## dsu mode

To specify the interoperability mode used by a T3 or an E3 controller, use the **dsu mode** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

**dsu mode mode**

**no dsu mode**

### Syntax Description

|             |                                                                                                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>mode</i> | DSU mode. Valid values are as follows:                                                                                                                                                                           |
|             | <ul style="list-style-type: none"> <li>• (T3 only) <b>adtran</b></li> <li>• cisco</li> <li>• digital-link</li> <li>• kentrox</li> <li>• (T3 only) <b>larscom</b></li> <li>• (T3 only) <b>verilink</b></li> </ul> |
|             | The default is cisco.                                                                                                                                                                                            |

### Command Default

The default is cisco.

### Command Modes

T3 configuration  
E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Refer to [Table 95: DSU Modes and Vendor-supported Bandwidths, on page 1079](#) for more information regarding the modes.

The local interface configuration must match the remote interface configuration. For example, if you define the data service unit (DSU) interoperability mode as **digital-link** on the local port, you must also do the same on the remote port.

You must know what type of DSU is connected to the remote port to determine if it interoperates with a T3 or an E3 controller. The **dsu mode** command enables and improves interoperability with other DSUs.

To verify the DSU mode configured on the interface, use the **show controllers t3** command in EXEC mode.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to set the DSU mode to **digital-link** for T3 controller 1 located in chassis 0, on a SIP in slot 6 and SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RP0/CPU0:router(config-t3)# dsu mode digital-link
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## dsu remote

To control the bandwidth usage with the remote port, use the **dsu remote** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

**dsu remote {disable| fullrate}**

**no dsu remote**

### Syntax Description

|                 |                                                                          |
|-----------------|--------------------------------------------------------------------------|
| <b>disable</b>  | Denies incoming remote requests to reset the bandwidth to the full rate. |
| <b>fullrate</b> | Requests that the remote port set its bandwidth to full rate.            |

### Command Default

Remote accept is the default.

### Command Modes

T3 configuration  
E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

To verify the DSU remote settings configured on the interface, use the **show controllers t3** or **show controllers e3** command in EXEC mode.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to specify that the connected remote port set its bandwidth to full rate:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/2/0
RP/0/RP0/CPU0:router(config-t3)# dsu remote fullrate
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## framing (E3)

To select the frame type for E3 data lines, use the **framing** command in E3 configuration mode. To disable E3 framing, use the **no** form of this command.

**framing** {g751| g832}

**no framing** {g751| g832}

### Syntax Description

|             |                                                                                    |
|-------------|------------------------------------------------------------------------------------|
| <b>g751</b> | Specifies that G.751 framing is used as the E3 framing type. The default is G.751. |
| <b>g832</b> | Specifies that G.832 framing is used as the E3 framing type.                       |

### Command Default

The default is G.751.

### Command Modes

E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you do not use the **framing** command, the default is used by the E3 controllers to automatically determine the framing type received from the far-end equipment.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to select G751 as the E3 frame type:

```
RP/0/RP0/CPU0:router(config)# controller e3 0/6/0/0
RP/0/RP0/CPU0:router(config-e3)# framing g751
```



**Related Commands**

| Command                                            | Description                                                                                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3</a> , on page 1098 | Displays information about the E3 links and hardware and software drivers for the E3 controller. |

## framing (T3)

To select the frame type for T3 data lines, use the **framing** command in T3 configuration mode. To disable T3 framing, use the **no** form of this command.

**framing** {auto-detect | c-bit| m23}

**no framing** {auto-detect | c-bit| m23}

### Syntax Description

|                    |                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------|
| <b>auto-detect</b> | Specifies that application identification channel signal framing is used as the T3 framing type. |
| <b>c-bit</b>       | Specifies that C-bit framing is used as the T3 framing type. The default is <b>c-bit</b> .       |
| <b>m23</b>         | Specifies that M23 framing is used as the T3 framing type.                                       |

### Command Default

The default is **c-bit**.

### Command Modes

T3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

If you do not use the **framing** command, the default is used by the T3 controllers to automatically determine the framing type received from the far-end equipment.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to select M23 as the T3 frame type:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RP0/CPU0:router(config-t3)# framing m23
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# hw-module subslot cardtype

To set the ports on a SPA in T3 or E3 mode, use the **hw-module subslot cardtype** command in global configuration mode. To deselect the card type, use the **no** form of this command.

**hw-module subslot subslot-id cardtype {e3| t3}**

**no hw-module subslot subslot-id cardtype {e3| t3}**

## Syntax Description

|                   |                                                                                                                                    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>subslot-id</b> | Subslot to be power cycled. The <i>subslot-id</i> argument is entered in the <i>rack/slot/subslot</i> notation.                    |
| <b>e3</b>         | Clear-channel E3 with integrated DSUs.                                                                                             |
| <b>t3</b>         | Clear-channel T3 with integrated data service units (DSUs). The default for the 2-Port and 4-Port Clear Channel T3/E3 SPAs is T3 . |

## Command Default

The default for the 2-Port and 4-Port Clear Channel T3/E3 SPAs is T3.

## Command Modes

Global configuration

## Command History

| Release       | Modification                                     |
|---------------|--------------------------------------------------|
| Release 3.5.0 | This command was introduced for T3 and E3 modes. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **hw-module subslot cardtype** command applies only to the following SPAs:

- 2-Port and 4-Port Clear Channel T3/E3 SPAs

By default, the 2-Port and 4-Port Clear Channel T3/E3 SPAs boot in T3 mode . Use the **hw-module subslot cardtype** command to change the setting to E3 for the 2-Port and 4-Port Clear Channel T3/E3 SPAs .

If there are nondefault configurations on the card interfaces, you must delete them before you can change the card type. Use the **no controller { e3 | t3}** and **no interface serial** commands to delete any T3, E3, or serial configurations.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| root-lr | read, write |

**Examples**

The following example shows how to configure all ports of a 2-Port or 4-Port Clear Channel T3/E3 SPA located in slot 5, subslot 2 to E3 mode:

```
RP/0/RP0/CPU0:router(config)# hw-module subslot 0/5/2 cardtype e3
```

**Related Commands**

| Command                                     | Description                                                                            |
|---------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">controller e3, on page 1066</a> | Configures an E3 controller and enters E3 configuration mode.                          |
| <a href="#">controller t1</a>               |                                                                                        |
| <a href="#">controller t3, on page 1068</a> | Configures a T3 controller and enters T3 configuration mode.                           |
| <a href="#">interface serial</a>            | Configures a serial interface and enters interface or subinterface configuration mode. |

# loopback (T3/E3)

To loop the entire T3 or E3 line on the T3 controller or E3 controller, use the **loopback** command in T3 or E3 configuration mode. To remove the loop, use the **no** form of this command.

**loopback** {**local** | {**network** | **remote** {**line** | **payload**}}}

**no loopback**

## Syntax Description

|                                                 |                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>local</b>                                    | Loops the data back toward the router and sends an alarm indication signal (AIS) out toward the network.                                                                                                                                                                              |
| <b>network</b> { <b>line</b>   <b>payload</b> } | Sets the loopback toward the network before going through the framer ( <b>line</b> ) or after going through the framer ( <b>payload</b> ).                                                                                                                                            |
| <b>remote</b> { <b>line</b>   <b>payload</b> }  | Sends a far-end alarm control (FEAC) request to the remote end requesting that it enter into a network line loopback. FEAC requests (and therefore remote loopbacks) are possible only when the T3 is configured for C-bit framing. The M23 format does not support remote loopbacks. |

## Command Default

No loops are configured on the T3 line.

## Command Modes

T3 configuration  
E3 configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **loopback** command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **show controllers t3** or **show controllers e3** command in EXEC mode. Note that remote loopback is valid only in C-bit parity mode.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to configure the T3 for a local loopback:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/3/0/0
RP/0/RP0/CPU0:router(config-t3)# loopback local
```

## Related Commands

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">framing (E1)</a>                      | Selects the frame type for an E1 data line.                                                      |
| <a href="#">framing (T1)</a>                      | Selects the frame type for a T1 data line.                                                       |
| <a href="#">loopback (T1/E1)</a>                  | Loops individual T1 or E1 channels on the channelized T3 controller.                             |
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# mdl

To configure the Maintenance Data Link (MDL) message defined in the ANSI T1.107a-1990 specification, use the **mdl** command in T3 configuration mode. To remove the message, use the **no** form of this command.

```
{mdl string {eic| fi| fic| gen-number| lic| port-number| unit} string| transmit {idle-signal| path| test-signal}
{disable| enable}}
```

```
{no mdl string {eic| fi| fic| gen-number| lic| port-number| unit} string| transmit {idle-signal| path|
test-signal} {disable| enable}}
```

## Syntax Description

|                                         |                                                                                                        |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>string eic</b> <i>string</i>         | Specifies the Equipment Identification Code; can be up to 10 characters.                               |
| <b>string fi</b> <i>string</i>          | Specifies the Facility Identification Code sent in the MDL Path message; can be up to 38 characters.   |
| <b>string fic</b> <i>string</i>         | Specifies the Frame Identification Code; can be up to 10 characters.                                   |
| <b>string gen-number</b> <i>string</i>  | Specifies the Generator number string sent in the MDL Test Signal message; can be up to 38 characters. |
| <b>string lic</b> <i>string</i>         | Specifies the Location Identification Code; can be up to 11 characters.                                |
| <b>string port-number</b> <i>string</i> | Specifies the Port number string sent in the MDL Idle Signal message; can be up to 10 characters.      |
| <b>string unit</b> <i>string</i>        | Specifies the Unit Identification Code; can be up to 6 characters.                                     |
| <b>transmit idle-signal</b>             | Specifies the transmission of the MDL Idle Signal message.                                             |
| <b>transmit path</b>                    | Specifies the transmission of the MDL Path message.                                                    |
| <b>transmit test-signal</b>             | Specifies the transmission of the MDL Test Signal message.                                             |
| <b>disable   enable</b>                 | Disables or enables transmission of the specified message.                                             |

## Command Default

No MDL message is configured.

## Command Modes

T3 configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |



**Usage Guidelines**

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show controllers t3** command to display MDL information (received strings). MDL information is displayed only when framing is set to C-bit.

**Note**

MDL is supported only when the DS3 framing is C-bit parity.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows the **mdl** commands on a T3 controller in slot 1, subslot 2, port 0:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/1/2/0
RP/0/RP0/CPU0:router(config-t3)# clock source line
RP/0/RP0/CPU0:router(config-t3)# mdl string eic ID
RP/0/RP0/CPU0:router(config-t3)# mdl string fic Building B
RP/0/RP0/CPU0:router(config-t3)# mdl string unit ABC
RP/0/RP0/CPU0:router(config-t3)# mdl string fi Facility Z
RP/0/RP0/CPU0:router(config-t3)# mdl string port-number Port 7
RP/0/RP0/CPU0:router(config-t3)# mdl transmit path enable
RP/0/RP0/CPU0:router(config-t3)# mdl transmit idle-signal enable
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# mode

To set the mode of the T3/E3 controller, use the **mode** command in T3 or E3 configuration mode. To disable the controller mode, use the **no** form of this command.

**mode** {atm| serial}

**no mode** {atm| serial}

## Syntax Description

|               |                                                                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>atm</b>    | Specifies the mode of the port to be a clear channel transporting ATM.                                                                                |
| <b>serial</b> | (T3 and E3 only) Specifies the mode of the port to be clear channel serial. The default for the 2-Port and 4-Port Clear Channel T3/E3 SPAs is serial. |

## Command Default

## Command Modes

T3 configuration

E3 configuration

## Command History

| Release       | Modification                                       |
|---------------|----------------------------------------------------|
| Release 3.5.0 | This command was introduced for T3/E3 controllers. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

You can change the mode of a controller only when there are no subinterfaces defined for the controller.

For channelized SPAs, you must use the **mode** command before you can configure any channelized controllers.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to change the mode of a T3 port to atm:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RP0/CPU0:router(config-t3)# mode atm
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## national bits (E3)

To enable or disable the national reserved bit pattern on an E3 port, use the **national bits** command in E3 configuration mode. To revert to the default value, use the **no** form of this command.

**national bits** {disable| enable}

**no national bits** {disable| enable}

### Syntax Description

|                |                                                                               |
|----------------|-------------------------------------------------------------------------------|
| <b>disable</b> | Disables national reserved bits for an E3 port.                               |
| <b>enable</b>  | Enables national reserved bits for an E3 port. The default is <b>enable</b> . |

### Command Default

The default is **enable**.

### Command Modes

E3 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to enable the national bits for an E3 controller:

```
RP/0/RP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RP0/CPU0:router(config-e3)# national bits enable
```

**Related Commands**

| Command                                            | Description                                                                                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3</a> , on page 1098 | Displays information about the E3 links and hardware and software drivers for the E3 controller. |

# show controllers e3

To display information about the E3 links and hardware and software drivers for the E3 controller, use the **show controllers e3** command in EXEC mode.

**show controllers e3** *interface-path-id* [**all**|**bert**|**brief**|**internal-state**|**tabular**]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>all</b>               | Displays all information for the controllers.                                                                                                                                                                                                                                   |
| <b>bert</b>              | Displays internal E3 bit error rate test results.                                                                                                                                                                                                                               |
| <b>brief</b>             | Displays summary information for the E3 controller.                                                                                                                                                                                                                             |
| <b>internal-state</b>    | Displays internal E3 state information.                                                                                                                                                                                                                                         |
| <b>tabular</b>           | Displays E3 controller information in tabular format.                                                                                                                                                                                                                           |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.

- *module*: Module number. A physical layer interface module (PLIM) is always 0.
- *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

**Examples**

The following example shows sample output from the **show controllers e3** command for a single E3 port:

```
RP/0/RP0/CPU0:router# show controllers e3 0/2/0/0

E3 0/2/0/0 is down
Transmitter is sending RAI.
Receiver has loss of frame.
Framing is G.751, Line Code is B3ZS, Clock Source is Internal
Subrate is enabled. Mode: Cisco(default), Bandwidth: 34010 kbps
Remote accept is enabled
Remote fullrate has no request outstanding
Data in current interval (360 seconds elapsed):
 0 Line Code Violations, 0 P-bit Coding Violation
 0 C-bit Coding Violation, 0 P-bit Err Secs
 0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
 360 Unavailable Secs, 0 Line Error Secs
 0 C-bit Error Secs, 0 C-bit Severely Error Secs
```

The following example shows sample output from the **show controllers e3** command using the **tabular** keyword, for a single E3 port:

```
RP/0/RP0/CPU0:router# show controllers e3 0/2/0/0 tabular

E3 0/2/0/0 is down
Transmitter is sending RAI.
Receiver has loss of frame.
Framing is G.751, Line Code is B3ZS, Clock Source is Internal
Subrate is enabled. Mode: Cisco(default), Bandwidth: 34010 kbps
Remote accept is enabled
Remote fullrate has no request outstanding
INTERVAL LCV PCV CCV PES PSES SEFS UAS LES CES CSES
07:49-07:56 0 0 0 0 0 0 380 0 0 0
Data in current interval (380 seconds elapsed):
 0 Line Code Violations, 0 P-bit Coding Violation
 0 C-bit Coding Violation, 0 P-bit Err Secs
 0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
 380 Unavailable Secs, 0 Line Error Secs
 0 C-bit Error Secs, 0 C-bit Severely Error Secs
```

**Table 96: show controllers e3 Field Descriptions**

| Field                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmitter is sending RAI                 | Any alarms detected by the controller are displayed here. Possible alarms are as follows: <ul style="list-style-type: none"> <li>• Transmitter is sending remote alarm.</li> <li>• Transmitter is sending AIS.</li> <li>• Receiver has loss of signal.</li> <li>• Receiver is getting AIS.</li> <li>• Receiver has loss of frame.</li> <li>• Receiver has remote alarm.</li> <li>• Receiver has no alarms.</li> </ul> |
| Framing                                    | Framing type on the controller. Values are G.751 and G.832.                                                                                                                                                                                                                                                                                                                                                           |
| Line Code                                  | Line coding format on the controller.                                                                                                                                                                                                                                                                                                                                                                                 |
| Clock Source                               | Clock source on the channelized controller. Values are internal and line.                                                                                                                                                                                                                                                                                                                                             |
| Data in current interval (seconds elapsed) | Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.                                                                                                                                                                               |
| Line Code Violations                       | Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.                                                                                                                                                                                            |
| P-bit Coding Violation                     | For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.                                                                                                                                                      |
| C-bit Coding Violation                     | For C-bit parity and SYNTRAN DS3 applications, the C-bit coding violation (CCV) is the count of coding violations reported by the C-bits. For C-bit parity, it is the count of CP-bit parity errors that occur during the accumulation interval. For SYNTRAN, it is a count of CRC-9 errors that occur during the accumulation interval.                                                                              |



| Field                       | Description                                                                                                                                                                                               |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P-bit Err Secs              | P-bit errored seconds (PES) is a second with one or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.          |
| P-bit Severely Err Secs     | P-bit severely errored seconds (PSES) is a second with 44 or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted. |
| Severely Err Framing Secs   | Severely errored framing seconds (SEFS) is a second with one or more out-of-frame defects or a detected incoming AIS.                                                                                     |
| Unavailable Secs            | The number of unavailable seconds (UAS) is calculated by counting the number of seconds for which the interface is unavailable. For more information, see RFC 1407, <i>DS3 MIB Variables</i> .            |
| Line Errored Secs           | Line errored seconds (LES) is a second in which one or more code violations or one or more LOS defects occurred.                                                                                          |
| C-bit Errored Secs          | C-bit errored seconds (CES) is a second with one or more C-bit code violations (CCV), one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.  |
| C-bit Severely Errored Secs | C-bit severely errored seconds (CSES) is a second with 44 or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.                |
| Total Data (last 24 hours)  | Shows the last 15-minute accumulation period.                                                                                                                                                             |

**Related Commands**

| Command                                     | Description                                                   |
|---------------------------------------------|---------------------------------------------------------------|
| <a href="#">controller e3, on page 1066</a> | Configures an E3 controller and enters E3 configuration mode. |

# show controllers t3

To display information about the T3 links and hardware and software drivers for the T3 controller, use the **show controllers t3** command in EXEC mode.

**show controllers t3** *interface-path-id* [**all**|**bert**|**brief**|**internal-state**|**tabular**]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>all</b>               | Displays all information for the controllers.                                                                                                                                                                                                                                   |
| <b>bert</b>              | Displays internal T3 bit error rate test results.                                                                                                                                                                                                                               |
| <b>brief</b>             | Displays summary information for the controller.                                                                                                                                                                                                                                |
| <b>internal-state</b>    | Displays internal T3 state information.                                                                                                                                                                                                                                         |
| <b>tabular</b>           | Displays T3 controller information in tabular format.                                                                                                                                                                                                                           |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- When specifying a T3 controller, the naming notation is *rack/slot/module/port/T3num*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - rack*—Chassis number of the rack.

- *slot*—Physical slot number of the line card or SIP.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

**Examples**

The following example shows sample output from the **show controllers t3** command using the **brief** keyword for a single T3 port:

```
RP/0/RP0/CPU0:router# show controllers t3 0/4/2/0/1 brief

T3 0/4/2/0 is up
No alarms detected.
mode: serial
MDL transmission is disabled
 EIC: , LIC: , FIC: , UNIT:
 Path FI:
 Idle Signal PORT_NO:
 Test Signal GEN_NO:
FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
Alarm Soaking Interval:
 Alarm Declaring= 2500 msec
 Alarm clearing = 10000 msec
BERT test result (not running)
 Test Pattern : Not Configured, Status : not running, Sync Detected : 0
 Interval : 1 minute(s), Time Remain : 0 (ms)
 Bit Errors (since BERT started): 0 bits,
 Bits Received (since BERT started): 0 Kbits
 Bit Errors (since last sync): 0 bits
 Bits Received (since last sync): 0 Kbits
```

**Table 97: show controllers t3 brief Field Descriptions**

| Field              | Description                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T3 0/4/2/0/1 is up | T3 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped). |

| Field               | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No alarms detected  | Any alarms detected by the controller are displayed here. Possible alarms are as follows: <ul style="list-style-type: none"> <li>• Transmitter is sending remote alarm.</li> <li>• Transmitter is sending AIS.</li> <li>• Receiver has loss of signal.</li> <li>• Receiver is getting AIS.</li> <li>• Receiver has loss of frame.</li> <li>• Receiver has remote alarm.</li> <li>• Receiver has no alarms.</li> </ul> |
| mode                | Mode of the T3 controller, which can be ATM, serial, or T1serial or T1 .                                                                                                                                                                                                                                                                                                                                              |
| MDL transmission    | Status of the Maintenance Data Link (either enabled or disabled) and the values of the MDL message fields.                                                                                                                                                                                                                                                                                                            |
| EIC                 | Equipment Identification Code.                                                                                                                                                                                                                                                                                                                                                                                        |
| LIC                 | Location Identification Code.                                                                                                                                                                                                                                                                                                                                                                                         |
| FIC                 | Frame Identification Code.                                                                                                                                                                                                                                                                                                                                                                                            |
| UNIT                | Unit Identification Code.                                                                                                                                                                                                                                                                                                                                                                                             |
| Path FI             | Path facility identifier.                                                                                                                                                                                                                                                                                                                                                                                             |
| Idle Signal PORT_NO | Identifies the port that initiates the idle signal message.                                                                                                                                                                                                                                                                                                                                                           |
| Test Signal GEN_NO  | Generator number to send in test signal messages.                                                                                                                                                                                                                                                                                                                                                                     |

| Field                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FEAC code received     | <p>Whether or not a far-end alarm code request is being received. Possible values are as follows:</p> <ul style="list-style-type: none"> <li>• DS3 Eqpt. Failure (SA)</li> <li>• DS3 LOS/HBER</li> <li>• DS3 Out-of-Frame</li> <li>• DS3 AIS Received</li> <li>• DS3 IDLE Received</li> <li>• DS3 Eqpt. Failure (NSA)</li> <li>• Common Eqpt. Failure (NSA)</li> <li>• Multiple DS1 LOS/HBER</li> <li>• DS1 Eqpt. Failure</li> <li>• Single DS1 LOS/HBER</li> <li>• DS1 Eqpt. Failure (NSA)</li> <li>• No code is being received</li> </ul> |
| Framing                | Framing type on the channelized controller. Values are auto-detect, M23, and C-Bit.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Line Code              | Line coding format on the channelized controller. Values are AMI and B8ZS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Clock Source           | Clock source on the channelized controller. Values are internal and line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Alarm Soaking Interval | <p>Values of the following alarm soaking intervals:</p> <ul style="list-style-type: none"> <li>• Alarm declarings: amount of time, in milliseconds, after which an alarm is declared.</li> <li>• Alarm clearing: amount of time, in milliseconds, after which an alarm is cleared.</li> </ul>                                                                                                                                                                                                                                               |
| BERT test result       | <p>Indicates the current state of the test. Can be one of the following:</p> <ul style="list-style-type: none"> <li>• running—BER test is still in progress.</li> <li>• done—BER test is complete.</li> <li>• not running—BER test is not running on the controller.</li> </ul>                                                                                                                                                                                                                                                             |
| Test Pattern           | Indicates the test pattern you selected for the test.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Field                              | Description                                                                                                                                                                                                                                                      |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status                             | Indicates the current synchronization state (sync).                                                                                                                                                                                                              |
| Sync Detected                      | Indicates the number of times synchronization has been detected during this test.                                                                                                                                                                                |
| Interval                           | Indicates the length of the test.                                                                                                                                                                                                                                |
| Time Remain                        | Indicates the time remaining for the test to run.<br><br><b>Note</b> If you terminate a BER test, you receive a message similar to the following: Time Remain : 2 minute(s) (unable to complete) "(Unable to complete)" signifies that you interrupted the test. |
| Bit Errors (since BERT started)    | Bit errors that have been detected since the test started.                                                                                                                                                                                                       |
| Bits Received (since BERT started) | Total number of test bits that have been received since the test started.                                                                                                                                                                                        |
| Bit Errors (since last sync)       | Bit errors that have been detected since the synchronization started.                                                                                                                                                                                            |
| Bits Received (since last sync)    | Total number of test bits that have been received since the synchronization started.                                                                                                                                                                             |

The following example shows sample output from the **show controllers t3** command using the **tabular** keyword, for a single T3 port:

```
RP/0/RP0/CPU0:router# show controllers 0/4/2/0/1 tabular
```

```
T3 0/4/2/0/1 is up
 INTERVAL LCV PCV CCV PES PSES SEFS UAS LES CES CSES
 09:00-09:02 0 0 0 0 0 0 0 0 0 0
 08:45-09:00 0 0 0 0 0 0 0 0 0 0
 08:30-08:45 0 0 0 0 0 0 0 0 0 0
 08:15-08:30 0 0 0 0 0 0 0 0 0 0
 08:00-08:15 0 0 0 0 0 0 0 0 0 0
 07:45-08:00 0 0 0 0 0 0 0 0 0 0
 07:30-07:45 0 0 0 0 0 0 0 0 0 0
 .
 .
 .
```

The following example shows sample output from the **show controllers t3** command for a single T3 port:

```
RP/0/RP0/CPU0:router# show controllers t3 0/4/2/0/1
```

```
T3 0/4/2/0/1 is up
No alarms detected.
mode: serial
MDL transmission is disabled
 EIC: , LIC: , FIC: , UNIT:
 Path FI:
```

```

Idle Signal PORT NO:
Test Signal GEN_NO:
FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
Data in current interval (695 seconds elapsed):
 0 Line Code Violations, 0 P-bit Coding Violation
 0 C-bit Coding Violation, 0 P-bit Err Secs
 0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
 0 Unavailable Secs, 0 Line Errored Secs
 0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 1:
 0 Line Code Violations, 0 P-bit Coding Violation
 0 C-bit Coding Violation, 0 P-bit Err Secs
 0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
 0 Unavailable Secs, 0 Line Errored Secs
 0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 2:
 0 Line Code Violations, 0 P-bit Coding Violation
 0 C-bit Coding Violation, 0 P-bit Err Secs
 0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
 0 Unavailable Secs, 0 Line Errored Secs
 0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 3:
 0 Line Code Violations, 0 P-bit Coding Violation
 0 C-bit Coding Violation, 0 P-bit Err Secs
 0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
 0 Unavailable Secs, 0 Line Errored Secs
 0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
.
.
.

```

**Table 98: show controllers t3 and show controllers t3 tabular Field Descriptions**

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T3 0/4/2/0/1 is up | T3 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).                                                                                                                                                                                                                                                         |
| No alarms detected | Any alarms detected by the controller are displayed here. Possible alarms are as follows: <ul style="list-style-type: none"> <li>• Transmitter is sending remote alarm.</li> <li>• Transmitter is sending AIS.</li> <li>• Receiver has loss of signal.</li> <li>• Receiver is getting AIS.</li> <li>• Receiver has loss of frame.</li> <li>• Receiver has remote alarm.</li> <li>• Receiver has no alarms.</li> </ul> |
| mode               | Mode of the T3 controller, which can be ATM, serial, T1, or E1 serial or T1 ATM or serial .                                                                                                                                                                                                                                                                                                                           |

| Field               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MDL transmission    | Status of the Maintenance Data Link (either enabled or disabled) and the values of the MDL message fields.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| EIC                 | Equipment Identification code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| LIC                 | Location Identification code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| FIC                 | Frame Identification code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| UNIT                | Unit Identification code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Path FI             | Path facility identifier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Idle Signal PORT_NO | Identifies the port that initiates the idle signal message.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Test Signal GEN_NO  | Generator number to send in test signal messages.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| FEAC code received  | Whether or not a far-end alarm code request is being received. Possible values are as follows: <ul style="list-style-type: none"> <li>• DS3 Eqpt. Failure (SA)</li> <li>• DS3 LOS/HBER</li> <li>• DS3 Out-of-Frame</li> <li>• DS3 AIS Received</li> <li>• DS3 IDLE Received</li> <li>• DS3 Eqpt. Failure (NSA)</li> <li>• Common Eqpt. Failure (NSA)</li> <li>• Multiple DS1 LOS/HBER</li> <li>• DS1 Eqpt. Failure</li> <li>• Single DS1 LOS/HBER</li> <li>• DS1 Eqpt. Failure (NSA)</li> <li>• No code is being received</li> </ul> |
| Framing             | Framing type on the channelized controller. Values are M23 and C-Bit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Line Code           | Line coding format on the channelized controller. Values are AMI and B8ZS.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Clock Source        | Clock source on the channelized controller. Values are internal and line.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



| Field                                      | Description                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data in current interval (seconds elapsed) | Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.                                                                                                  |
| Line Code Violations                       | Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.                                                                                                               |
| P-bit Coding Violation                     | For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.                                                                         |
| C-bit Coding Violation                     | For C-bit parity and SYNTRAN DS3 applications, the C-bit coding violation (CCV) is the count of coding violations reported by the C-bits. For C-bit parity, it is the count of CP-bit parity errors that occur during the accumulation interval. For SYNTRAN, it is a count of CRC-9 errors that occur during the accumulation interval. |
| P-bit Err Secs                             | P-bit errored seconds (PES) is a second with one or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.                                                                                                                                         |
| P-bit Severely Err Secs                    | P-bit severely errored seconds (PSES) is a second with 44 or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.                                                                                                                                |
| Severely Err Framing Secs                  | Severely errored framing seconds (SEFS) is a second with one or more out-of-frame defects or a detected incoming AIS.                                                                                                                                                                                                                    |
| Unavailable Secs                           | The number of unavailable seconds (UAS) is calculated by counting the number of seconds for which the interface is unavailable. For more information, see RFC 1407, <i>DS3 MIB Variables</i> .                                                                                                                                           |
| Line Errored Secs                          | Line errored seconds (LES) is a second in which one or more code violations or one or more LOS defects occurred.                                                                                                                                                                                                                         |

| Field                       | Description                                                                                                                                                                                              |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C-bit Errored Secs          | C-bit errored seconds (CES) is a second with one or more C-bit code violations (CCV), one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted. |
| C-bit Severely Errored Secs | C-bit severely errored seconds (CSES) is a second with 44 or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.               |

**Related Commands**

| Command                                      | Description                                                  |
|----------------------------------------------|--------------------------------------------------------------|
| <a href="#">controller t3</a> , on page 1068 | Configures a T3 controller and enters T3 configuration mode. |

## shutdown (T3/E3)

To disable a T3 or E3 controller, use the **shutdown** command in T3 or E3 configuration mode. To restart a disabled T3 or E3 controller, use the **no** form of this command.

**shutdown**

**no shutdown**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** T3 configuration  
E3 configuration

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Shutting down the T3 or E3 controller disables all functions on the interface and sends an AIS alarm to the network. The **shutdown** command marks the interface as unavailable. To check if the controller is disabled, use the **show controllers t3** or **show controllers e3** command.

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples** The following example shows how to bring up a controller that was previously shut down:

```
RP/0/RP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RP0/CPU0:router(config-t3)# no shutdown
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1098</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1102</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |



## VLAN Subinterface Commands on the Cisco IOS XR Software

---

This module provides command line interface (CLI) commands for configuring 802.1Q VLANs on the Cisco CRS Router.

- [dot1q native vlan, page 1114](#)
- [dot1q vlan, page 1116](#)
- [interface \(VLAN\), page 1118](#)
- [show vlan interface, page 1120](#)
- [show vlan tags, page 1122](#)
- [show vlan trunks, page 1124](#)

# dot1q native vlan

To assign the native VLAN ID of a physical interface trunking 802.1Q VLAN traffic, use the **dot1q native vlan** command in interface configuration mode. To remove the VLAN ID assignment, use the **no** form of this command.

**dot1q native vlan** *vlan-id*  
**no dot1q native vlan** *vlan-id*

|                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                              |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Syntax Description</b>                                                                       | <i>vlan-id</i> Trunk interface ID. Range is from 1 to 4094 inclusive (0 and 4095 are reserved).                                                                                                                                                                                                                                                                                                                                                                                     |                              |
| <b>Command Default</b>                                                                          | No default behavior or values                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |
| <b>Command Modes</b>                                                                            | Interface configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |
| <b>Command History</b>                                                                          | <b>Release</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Modification</b>          |
|                                                                                                 | Release 3.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | This command was introduced. |
| <b>Usage Guidelines</b>                                                                         | <p>To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.</p> <p>The <b>dot1q native vlan</b> command defines the default, or native VLAN, associated with a 802.1Q trunk interface. The native VLAN of a trunk interface is the VLAN to which all untagged VLAN packets are logically assigned.</p> |                              |
|  <b>Note</b> | The native VLAN cannot be configured on a subinterface of the trunk interface. The native VLAN must be configured with the same value at both ends of the link, or traffic can be lost or sent to the wrong VLAN.                                                                                                                                                                                                                                                                   |                              |
| <b>Task ID</b>                                                                                  | <b>Task ID</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Operations</b>            |
|                                                                                                 | vlan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | read, write                  |

## Examples

The following example shows how to configure the native VLAN of a TenGigE0/2/0/4 trunk interface as 1. Packets received on this interface that are untagged, or that have an 802.1Q tag with VLAN ID 1, are received on the main interface. Packets sent from the main interface are transmitted without an 802.1Q tag.

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/2/0/4
RP/0/RP0/CPU0:router(config-if)# dot1q native vlan 1
```

## Related Commands

| Command                                                   | Description                                                                                                 |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <a href="#">dot1q vlan</a> , <a href="#">on page 1116</a> | Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface). |

# dot1q vlan

To assign a VLAN ID to a subinterface (or to modify the VLAN ID that is currently assigned to a subinterface), use the **dot1q vlan** command in subinterface configuration mode. To remove the VLAN ID assigned to a subinterface, use the **no** form of this command.

**dot1q vlan** *vlan-id* [*vlan-id2*] **any**

**no dot1q vlan** *vlan-id*

## Syntax Description

|                 |                                                                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>vlan-id</i>  | ID of the subinterface. Range is from 1 to 4094 (0 and 4095 are reserved).                                                                              |
| <i>vlan-id2</i> | (Optional) Identifies the host VLAN of a Q-in-Q VLAN pair. Replace <i>vlan-id2</i> with a number that specifies the host VLAN. Range is from 1 to 4094. |
| <b>any</b>      | (Optional) Identifies the host VLAN of a Q-in any VLAN pair.                                                                                            |

## Command Default

No default behavior or values

## Command Modes

Subinterface configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The VLAN ID specifies where 802.1Q tagged packets are sent and received on a specified subinterface. An 802.1Q VLAN subinterface must have a configured VLAN ID to send and receive traffic; without a VLAN ID, the subinterface remains in the down state. All VLAN IDs must be unique among all subinterfaces configured on the same physical interface. To change a VLAN ID, the new VLAN must not already be in use on the same physical interface. To exchange VLAN IDs, you must remove the configuration information and reconfigure the ID for each device.



### Note

The subinterface does not pass traffic without an assigned VLAN ID.



**Task ID**

| Task ID | Operations  |
|---------|-------------|
| vlan    | read, write |

**Examples**

The following example shows how to configure the VLAN ID and IP address on a subinterface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RP0/CPU0:router(config-subif)# dot1q vlan 10
RP/0/RP0/CPU0:router(config-subif)# ipv4 addr 10.0.0.1/24
```

The following example shows how to configure the VLAN IDs for both VLANs in a single Q-in-Q attachment circuit (AC). In this case, incoming traffic must match both of the VLAN IDs before it is accepted by the subinterface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RP0/CPU0:router(config-subif)# dot1q vlan 10 20
```

The following example shows how to configure the VLAN IDs for a Q-in-any AC. In this case, all incoming traffic must have two VLAN tags, where the outer VLAN ID matches the configured value, while the inner VLAN ID can be any value.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1 12transport
RP/0/RP0/CPU0:router(config-subif)# dot1q vlan 10 any
```

**Related Commands**

| Command                                           | Description                                                                             |
|---------------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">dot1q native vlan, on page 1114</a>   | Assigns the native VLAN ID of a physical interface trunking 802.1Q VLAN traffic.        |
| <a href="#">show interfaces, on page 629</a>      | Displays statistics for all interfaces configured on the router or for a specific node. |
| <a href="#">show vlan interface, on page 1120</a> | Displays summarized information about VLAN subinterfaces.                               |
| <a href="#">show vlan tags, on page 1122</a>      | Displays VLAN tagging allocation information.                                           |

# interface (VLAN)

To create a VLAN subinterface, use the **interface** command in global configuration mode. To delete a subinterface, use the **no** form of this command.

**interface** *type interface-path-id.subinterface* [**l2transport**]  
**no interface** *type interface-path-id.subinterface* [**l2transport**]

## Syntax Description

|                                       |                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i>                           | Type of Ethernet interface on which you want to create a VLAN. Enter <b>GigabitEthernet</b> , <b>TenGigE</b> , or <b>Bundle-Ether</b> .                                                                                                                                                                                                  |
| <i>interface-path-id.subinterface</i> | Physical interface or virtual interface followed by the subinterface path ID. Naming notation is <i>interface-path-id.subinterface</i> . The period in front of the subinterface value is required as part of the notation.<br><br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>l2transport</b>                    | Enables Layer 2 transport port mode on the specified VLAN interface and enters Layer 2 transport configuration mode. The l2transport keyword creates the Vlan interface in L2 mode so that it can be used for L2VPNs and local switching.                                                                                                |

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - rack*: Chassis number of the rack.
  - slot*: Physical slot number of the line card.

- *module*: Module number. A physical layer interface module (PLIM) is always 0.
- *port*: Physical port number of the interface.

- If specifying an Ethernet bundle interface, the range is from 1 through 65535.

For the *subinterface* argument, the range is from 0 through 4095.

To configure a large number of subinterfaces, we recommend entering all configuration data before you commit the **interface** command.

To change an interface from Layer 2 to Layer 3 mode and back, you must delete the interface first and then re-configure it in the appropriate mode.

**Note**

A subinterface does not pass traffic without an assigned VLAN ID.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| vlan    | read, write |

**Examples**

The following example shows how to configure a VLAN subinterface on a 10-Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/0/0/1.2
RP/0/RP0/CPU0:router(config-subif)# dot1q vlan 1
RP/0/RP0/CPU0:router(config-subif)# ipv4 address 50.0.0.1/24
```

The following example shows how to create a VLAN subinterface with Layer 2 transport port mode enabled, and enter Layer 2 transport configuration mode under that VLAN:

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/4/0/1.1
RP/0/RP0/CPU0:router(config-if-l2)#
```

**Related Commands**

| Command                                         | Description                                                                                                 |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <a href="#">dot1q native vlan, on page 1114</a> | Assigns the native VLAN ID of a physical interface trunking 802.1Q VLAN traffic.                            |
| <a href="#">dot1q vlan, on page 1116</a>        | Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface). |

# show vlan interface

To display summarized information about VLAN subinterfaces, use the **show vlan interface** command in EXEC mode.

**show vlan interface** [*type interface-path-id.subinterface*] **location** *instance*]

| Syntax Description                    |                                                                                                                                                                                                                                                                                                                                          |  |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <i>type</i>                           | (Optional) Type of Ethernet interface whose VLAN information you want to display. Enter <b>GigabitEthernet</b> , <b>TenGigE</b> , or <b>Bundle-Ether</b> .                                                                                                                                                                               |  |
| <i>interface-path-id.subinterface</i> | Physical interface or virtual interface followed by the subinterface path ID. Naming notation is <i>interface-path-id.subinterface</i> . The period in front of the subinterface value is required as part of the notation.<br><br>For more information about the syntax for the router, use the question mark (?) online help function. |  |
| <b>location</b> <i>instance</i>       | (Optional) Displays VLAN subinterfaces on a particular port. The <i>instance</i> argument is entered in the <i>rack/slot/module/port</i> notation.                                                                                                                                                                                       |  |

**Command Default** No default behavior or values

**Command Modes** EXEC

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | Release 3.0 | This command was introduced. |

**Usage Guidelines** To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.

- If specifying an Ethernet bundle interface, the range is from 1 through 65535.

For the *subinterface* argument, the range is from 0 through 4095.

Enter the **show vlan interface** command without including any of the optional parameters to display summarized information about all VLANs configured on the router.

**Task ID**

| Task ID | Operations |
|---------|------------|
| vlan    | read       |

**Table 99: show vlan interface Field Descriptions**

| Field         | Description                                                                                                                                                                      |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| interface     | VLAN subinterface.                                                                                                                                                               |
| encapsulation | Encapsulation of the VLAN subinterface. Currently, this is always 802.1Q.                                                                                                        |
| Outer VLAN    | VLAN ID currently assigned to the subinterface. Range is from 1 to 4094 (or blank if no VLAN ID has been assigned).                                                              |
| 2nd VLAN      | VLAN ID currently assigned to the second subinterface in a pair. Range is from 1 to 4094 (or blank if no VLAN ID has been assigned). For Q-in-any VLANs, this field shows “Any.” |
| Service       | Service currently assigned to the VLAN. Possible services are L2 and L3.                                                                                                         |
| MTU           | Maximum transmission unit (MTU) value configured for the specified VLAN, in bytes.                                                                                               |
| LineP state   | Displays the line protocol state of the VLAN interface. Possible states: up, down, admin-down. The line protocol state reflects whether a VLAN ID is configured or not.          |

**Related Commands**

| Command                                         | Description                                                                             |
|-------------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show interfaces</a> , on page 629   | Displays statistics for all interfaces configured on the router or for a specific node. |
| <a href="#">show vlan trunks</a> , on page 1124 | Displays information about VLAN trunks.                                                 |

# show vlan tags

To display VLAN tagging allocation information, use the **show vlan tags** command in EXEC mode.

**show vlan tags** [*type interface-path-id*] **location** *node-id*]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i>                    | Displays VLAN tagging information for a specific bundle type.<br><br><b>Note</b> Use the <b>show interfaces</b> command with the <b>Bundle-Ether</b> , <b>GigabitEthernet</b> or <b>TenGigE</b> keyword to see a list of all Ethernet bundles currently configured on the router. |
| <i>interface-path-id</i>       | Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function.   |
| <b>location</b> <i>node-id</i> | Displays VLAN tagging information for a specific node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.                                                                                                                                            |

## Command Default

Enter the command without any of the optional keywords or arguments to display tagging allocation information for all VLANS configured on the router.

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.

◦ *port*: Physical port number of the interface.

- If specifying an Ethernet bundle interface, the range is from 1 through 65535.

## Task ID

| Task ID | Operations |
|---------|------------|
| vlan    | read       |

## Examples

The following example shows how to display VLAN tagging allocation information for a router:

```
RP/0/RP0/CPU0:router(config-subif)# show vlan tagsl2protocol cdp drop
```

| Interface   | Outer<br>VLAN | 2nd<br>VLAN | Service | MTU  | LineP<br>State |
|-------------|---------------|-------------|---------|------|----------------|
| Gi0/1/5/0.1 | 10            |             | L3      | 1518 | up             |
| Gi0/1/5/0.2 | 20            |             | L3      | 1518 | up             |
| Gi0/1/5/0.3 | 30            |             | L3      | 1518 | up             |

**Table 100: show vlan tags Field Descriptions**

| Field       | Description                                                                                                                        |
|-------------|------------------------------------------------------------------------------------------------------------------------------------|
| Outer Vlan  | The first (outermost) 802.1Q VLAN ID. This field is empty if no VLAN ID is configured. An asterisk (*) indicate the native VLAN.   |
| 2nd Vlan    | The second 802.1Q VLAN ID. This field reports “any” for a Q-in-Any service. If no VLAN ID is configured, then this field is empty. |
| Service     | Service currently assigned to the subinterface. Can be Layer 2 (L2) or Layer 3 (L3).                                               |
| MTU         | Maximum transmission unit (MTU) value configured for the specified VLAN, in bytes.                                                 |
| LineP state | Displays the state of the VLAN interface. Possible states: up, down, admin-down.                                                   |

## Related Commands

| Command                                            | Description                                                                                                 |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <a href="#">dot1q vlan</a> , on page 1116          | Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface). |
| <a href="#">show vlan interface</a> , on page 1120 | Displays summarized information about VLAN subinterfaces.                                                   |
| <a href="#">show vlan trunks</a> , on page 1124    | Displays information about VLAN trunks.                                                                     |

# show vlan trunks

To display information about VLAN trunks, use the **show vlan trunks** command in EXEC mode.

**show vlan trunks** [**brief**] [**location** *node-id*] [*type interface-path-id*] [**summary**]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i>                    | (Optional) Type of Ethernet interface whose VLAN trunk information you want to display. Possible Ethernet types are <b>GigabitEthernet</b> , <b>TenGigE</b> , or <b>Bundle-Ether</b> .                                                                                                     |
| <i>interface-path-id</i>       | (Optional) Physical interface or virtual interface.<br><br><b>Note</b> Use the <b>show interfaces</b> command to see a list of all interfaces currently configured on the router.<br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>brief</b>                   | (Optional) Displays a short summary output.                                                                                                                                                                                                                                                |
| <b>summary</b>                 | (Optional) Displays a summarize output.<br><br><b>Note</b> The <b>summary</b> option can be specified only if the trunk interface is not specified.                                                                                                                                        |
| <b>location</b> <i>node-id</i> | (Optional) Displays VLAN trunk information for a specific node. The <i>node-id</i> is expressed in the <i>rack/slot/module</i> notation.<br><br><b>Note</b> For more information about the syntax for the router, use the question mark (?) online help function.                          |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 3.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:



- *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

The **show vlan trunks** command provides summary information about VLAN trunk interfaces. It is used to determine the number of configured subinterfaces and verify the state of the subinterfaces.

## Task ID

| Task ID | Operations |
|---------|------------|
| vlan    | read       |

## Examples

The following is sample output from the **show vlan trunks** command:

```
RP/0/RP0/CPU0:router# show vlan trunks
GigabitEthernet0/4/0/0 is up
 Outer VLAN tag format is Dot1Q (0x8100)
 L3 Encapsulations: Ether, 802.1Q
 Sub-interfaces: 2
 2 are up
 Single tag sub-interfaces: 2
 No native VLAN Id
 L2 Encapsulations: 802.1Q
 VLAN ACs: 1
 1 are up
 Single tag ACs: 1
```

**Table 101: show vlan trunks summary Field Descriptions**

| Field                 | Description                                                                                                                                                                                                              |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outer VLAN tag format | <p>The first (outermost) 802.1Q VLAN Id.</p> <ul style="list-style-type: none"> <li>• This field is empty if no VLAN ID is configured.</li> <li>• An asterisk (*) indicates that a native VLAN is configured.</li> </ul> |

| Field                      | Description                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L3 Encapsulations          | <p>VLAN encapsulations currently used for terminated Layer 3 traffic. Possible Layer 3 encapsulations are as follows:</p> <ul style="list-style-type: none"> <li>• Nat – A Native VLAN is configured.</li> <li>• Q – One or more sub-interfaces are configured with either 0 or 1 802.1Q VLAN tags.</li> <li>• 2Q – One or more sub-interfaces have been configured with two 802.1Q VLAN tags.</li> </ul>            |
| Sub-interfaces             | <p>The number of subinterfaces configured on the main Ethernet interface, and the current state of those subinterfaces. Possible states are up, down, and admin-down.</p> <p><b>Note</b> The number of Down and Admin-down subinterfaces is only reported only if that number is greater than 0.</p>                                                                                                                 |
| Single tag sub-interfaces: | <p>Number of sub-interfaces configured with a single 802.1Q tag.</p> <p><b>Note</b> The number of sub-interfaces is displayed only if that number is greater than 0.</p>                                                                                                                                                                                                                                             |
| No native VLAN Id          | <p>Indicate that a native VLAN ID is not configured on this interface.</p>                                                                                                                                                                                                                                                                                                                                           |
| L2 Encapsulations:         | <p>VLAN encapsulations currently used for terminated L2 traffic. Possible Layer 2 encapsulations are as follows:</p> <ul style="list-style-type: none"> <li>• Q – One or more single 802.1Q tag ACs are configured.</li> <li>• 2Q – One or more double 802.1Q tag ACs have been configured.</li> <li>• Qany – One or more double 802.1Q tag ACs have been configured that have a wildcard “any” innertag.</li> </ul> |
| VLAN ACs                   | <p>Number of ACs currently configured under the specified interface.</p>                                                                                                                                                                                                                                                                                                                                             |
| Single tag ACs             | <p><b>Note</b> The number of sub-interfaces sub-interfaces configured with a single 802.1Q tag is displayed only if that number is greater than 0.</p>                                                                                                                                                                                                                                                               |

**Related Commands**

| Command                                         | Description                                                                             |
|-------------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show interfaces</a> , on page 629   | Displays statistics for all interfaces configured on the router or for a specific node. |
| <a href="#">interface (VLAN)</a> , on page 1118 | Creates a VLAN subinterface.                                                            |

**show vlan trunks**



## 10-Gigabit Ethernet WAN PHY Controller Commands on the Cisco IOS XR Software

---

This module describes the commands to configure a 10-Gigabit Ethernet WAN PHY physical controller on the Cisco CRS Router.

For information on 10-Gigabit Ethernet (GE) interface commands see the *Ethernet Interface Commands on the Cisco IOS XR Software* module.

- [clear controller wanphy, page 1130](#)
- [clear counters wanphy, page 1132](#)
- [controller wanphy, page 1134](#)
- [lanmode on, page 1136](#)
- [report sd-ber, page 1138](#)
- [report sf-ber disable, page 1140](#)
- [show controllers wanphy, page 1142](#)
- [threshold sd-ber, page 1152](#)
- [threshold sf-ber, page 1154](#)
- [wanmode on, page 1156](#)

# clear controller wanphy

To clear the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller, use the **clear controller wanphy** command in EXEC mode.

## clear controller wanphy interface-id stats

### Syntax Description

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-id</i> | Physical interface instance. Naming notation is <i>rack/slot/module/port</i> and a slash between values is required as part of the notation. <ul style="list-style-type: none"> <li>• <i>rack</i>: Chassis number of the rack.</li> <li>• <i>slot</i>: Physical slot number of the line card.</li> <li>• <i>module</i>: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number.</li> <li>• <i>port</i>: Physical port number of the interface.</li> </ul> <p>For more information about the syntax for the router, use the question mark (?) online help function.</p> |
| <b>stats</b>        | Clears alarm counters for the specified 10-Gigabit Ethernet WAN PHY controller.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### Command Default

No default behavior or values

### Command Modes

EXEC

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations           |
|-----------|----------------------|
| interface | read, write, execute |

## Examples

The following example shows how to configure a 10-Gigabit Ethernet WAN PHY controller in Slot 6:

```
RP/0/RP0/CPU0:router # clear controller wanphy 0/6/0/0 stats
```

## Related Commands

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |
| <a href="#">clear counters wanphy, on page 1132</a>   | Clears the alarms counters for a specific 10-Gigabit Ethernet WAN PHY interface.                 |

# clear counters wanphy

To clear the alarms counters for a specific 10-Gigabit Ethernet WAN PHY interface, use the **clear counters wanphy** command in EXEC mode.

**clear counters wanphy interface-id stats**

## Syntax Description

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-id</i> | Physical interface instance. Naming notation is <i>rack/slot/module/port</i> and a slash between values is required as part of the notation. <ul style="list-style-type: none"> <li>• <i>rack</i>: Chassis number of the rack.</li> <li>• <i>slot</i>: Physical slot number of the line card.</li> <li>• <i>module</i>: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number.</li> <li>• <i>port</i>: Physical port number of the interface.</li> </ul> <p>For more information about the syntax for the router, use the question mark (?) online help function.</p> |
| <b>stats</b>        | Clears alarm counters for the specified 10-Gigabit Ethernet WAN interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID   | Operations           |
|-----------|----------------------|
| interface | read, write, execute |



## Examples

The following example shows how to clear the alarms counters for a 10-Gigabit Ethernet WAN interface:

```
RP/0/RP0/CPU0:router # clear counters wanphy 0/6/0/0 stats
```

## Related Commands

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |
| <a href="#">clear controller wanphy, on page 1130</a> | Clears the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller.                |

# controller wanphy

To enter WAN physical controller configuration mode in which you can configure a 10-Gigabit Ethernet WAN PHY controller, use the **controller wanphy** command in global configuration mode. To return the 10-Gigabit Ethernet WAN PHY controller to its default WAN mode configuration, use the **no** form of this command.

**controller wanphy interface-id**

**no controller wanphy interface-id**

## Syntax Description

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-id</i> | Physical interface instance. Naming notation is <i>rack/slot/module/port</i> and a slash between values is required as part of the notation. <ul style="list-style-type: none"> <li>• <i>rack</i>: Chassis number of the rack.</li> <li>• <i>slot</i>: Physical slot number of the line card.</li> <li>• <i>module</i>: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number.</li> <li>• <i>port</i>: Physical port number of the interface.</li> </ul> |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

For more information about the syntax for the router, use the question mark (?) online help function.

## Command Default

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.



### Note

After you use the **no controller wanphy** command to return a 10-Gigabit Ethernet WAN PHY controller to its default configuration, you need to cycle the power to the 10-Gigabit Ethernet SPA for the mode configuration changes to take effect.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

The following example shows how to enter WAN PHY controller configuration mode:

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router(config)# controller wanphy 0/6/0/0
RP/0/RP0/CPU0:router(config-wanphy)#
```

The following example shows how to configure a 10-Gigabit Ethernet WAN PHY controller in slot 6 to run in LAN mode:

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router(config)# controller wanphy 0/6/0/0
RP/0/RP0/CPU0:router(config-wanphy)# lanmode on
RP/0/RP0/CPU0:router(config-wanphy)# commit
RP/0/RP0/CPU0:router(config-wanphy)# exit
RP/0/RP0/CPU0:router(config)# exit
RP/0/RP0/CPU0:router(config)# hw-module subslot 0/6/0 shutdown unpowered
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:router(config)# no hw-module subslot 0/6/0 shutdown unpowered
```

The following example shows how to return a 10-Gigabit Ethernet WAN PHY controller in slot 6 to run in its default WAN mode:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config)# no controller wanphy 0/6/0/0
RP/0/RP0/CPU0:Router(config)# commit
RP/0/RP0/CPU0:Router(config)# exit
RP/0/RP0/CPU0:router(config)# hw-module subslot 0/6/0 shutdown unpowered
RP/0/RP0/CPU0:Router(config)# commit
RP/0/RP0/CPU0:router(config)# no hw-module subslot 0/6/0 shutdown unpowered
```

**Related Commands**

| Command                                               | Description                                                                                                              |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <a href="#">lanmode on, on page 1136</a>              | Configures a 10-Gigabit Ethernet WAN PHY controller to run in LAN mode for a 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA. |
| <a href="#">show controllers wanphy, on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.                         |

# lanmode on

To configure a 10-Gigabit Ethernet WAN PHY controller to run in LAN mode for a 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA, use the **lanmode on** command in WAN physical controller configuration mode. To return the controller to the default, use the **no** form of this command.

**lanmode on**

**no lanmode on**

## Syntax Description

This command has no keywords or arguments.

## Command Default

The 10-Gigabit Ethernet WAN PHY controller default varies depending on the installed line card:

- For the 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA, the default mode is WAN mode.
- For the 4-Port, 8-Port, 14-Port, and 20-Port 10-Gigabit Ethernet LAN/WAN-PHY PLIMs, the default mode is LAN mode. This command does not apply.

## Command Modes

WAN physical controller configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to enable LAN mode on a 10-Gigabit Ethernet WAN PHY controller:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config)# controller wanphy 0/6/0/0
RP/0/RP0/CPU0:Router(config-wanphy)# lanmode on
```

To complete the mode change the SPA must be power-cycled.

The following example shows how to disable LAN mode on a 10-Gigabit Ethernet WAN PHY controller and return that controller to the default WAN mode:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config) # controller wanphy 0/6/0/0
RP/0/RP0/CPU0:srt-crs1(config-wanphy) # no lanmode on
```

To complete the mode change the SPA must be power-cycled.

#### Related Commands

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |

# report sd-ber

To enable Signal Degrade (SD) Bit Error Rate (BER) reporting, use the **report sd-ber** command in wanphy configuration mode. To disable Signal Degrade (SD) Bit Error Rate (BER) reporting, use the no form of this command.

**report sd-ber**

**no report sd-ber**

## Syntax Description

This command has no keywords or arguments.

## Command Default

Signal Degrade (SD) Bit Error Rate (BER) reporting is disabled by default.

## Command Modes

Wanphy configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to enable Signal Degrade (SD) Bit Error Rate (BER) reporting.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0/CPU0:router(config-wanphy)# report sd-ber
RP/0/RP0/CPU0:router(config-wanphy)#
```

## Related Commands

| Command                                                              | Description                |
|----------------------------------------------------------------------|----------------------------|
| <a href="#">report sf-ber disable</a> , <a href="#">on page 1140</a> | Disables SF BER reporting. |

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |
| <a href="#">threshold sf-ber, on page 1154</a>        | Configures the threshold of the SF BER that is used to trigger a link state change.              |

# report sf-ber disable

To disable Signal Failure (SF) Bit Error Rate (BER) reporting, use the **report sf-ber disable** command in wanphy configuration mode. To disable Signal Failure (SF) Bit Error Rate (BER) reporting, use the no form of this command.

**report sf-ber disable**

**no report sf-ber disable**

## Syntax Description

This command has no keywords or arguments.

## Command Default

Signal Failure (SF) Bit Error Rate (BER) reporting is enabled by default.

## Command Modes

Wanphy configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to disable Signal Failure (SF) Bit Error Rate (BER) reporting.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0/CPU0:router(config-wanphy)# report sf-ber disable
RP/0/RP0/CPU0:router(config-wanphy)#
```

## Related Commands

| Command                                                      | Description                                                 |
|--------------------------------------------------------------|-------------------------------------------------------------|
| <a href="#">report sd-ber</a> , <a href="#">on page 1138</a> | Enables Signal Degrade (SD) Bit Error Rate (BER) reporting. |



| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |
| <a href="#">threshold sf-ber, on page 1154</a>        | Configures the threshold of the SF BER that is used to trigger a link state change.              |

# show controllers wanphy

To display alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller, use the **show controllers wanphy** command in EXEC mode.

**show controller wanphy** *interface-id* [**alarms**] **all** | **registers**]

## Syntax Description

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-id</i> | Physical interface instance. Naming notation is <i>rack/slot/module/port</i> and a slash between values is required as part of the notation. <ul style="list-style-type: none"> <li>• <i>rack</i>: Chassis number of the rack.</li> <li>• <i>slot</i>: Physical slot number of the line card.</li> <li>• <i>module</i>: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number.</li> <li>• <i>port</i>: Physical port number of the interface.</li> </ul> <p>For more information about the syntax for the router, use the question mark (?) online help function.</p> |
| <b>alarms</b>       | Displays information about any alarms that are detected by the specified 10-Gigabit Ethernet WAN PHY controller.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>all</b>          | Displays registers, alarms, and module information for the specified 10-Gigabit Ethernet WAN PHY controller.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>registers</b>    | Displays registers for the specified 10-Gigabit Ethernet WAN PHY controller.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.5.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

**Examples**

The following example shows sample output from the **show controllers wanphy** command with the **all** keyword:

```
RP/0/RP0/CPU0:router# show controllers wanphy 0/3/4/0 all
```

```
Interface: wanphy0_3_4_0
Configuration Mode: WAN Mode
SECTION
 LOF = 1, LOS = 1, BIP(B1) = 2912
LINE
 AIS = 1, RDI = 0, FEBE = 949, BIP(B2) = 48562
PATH
 AIS = 1, RDI = 0, FEBE = 0, BIP(B2) = 0
 LOP = 0, NEWPTR = 0, PSE = 0, NSE = 0
WIS ALARMS
 SER = 9, FELCDP = 0, FEALSP = 0
 WLOS = 1, PLCD = 0
 LFEBIP = 47260, PBEC = 949

Active Alarms[All defects]: lof,
Active Alarms[Highest Alarms]: lof
 Rx(K1/K2): N/A, Tx(K1/K2): N/A
 S1S0 = N/A, C2 = N/A
PATH TRACE BUFFER
Remote IP addr: 000.000.000.000
BER thresholds: N/A
TCA thresholds: N/A
```

```
REGISTERS
P_FEBE : 949
L_FE_BIP: 47260
L_BIP : 48562
P_BEC : 949
S_BIP : 2912
J1-Rx0 : 0x3136
J1-Rx1 : 0x352e
J1-Rx2 : 0x3234
J1-Rx3 : 0x332e
J1-Rx4 : 0x3132
J1-Rx5 : 0x3900
J1-Rx6 : 0x3138
J1-Rx7 : 0x372e
Internal Information
Operational Mode : WAN Mode
Current Alarms: 0x8
```

**Table 102: show controllers wanphy Command Output Fields**

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface          | <p>Identifies the WAN physical interface, in the format <i>rack/slot/module/port</i>.</p> <ul style="list-style-type: none"> <li>• <i>rack</i>: Chassis number of the rack.</li> <li>• <i>slot</i>: Physical slot number of the line card.</li> <li>• <i>module</i>: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number.</li> <li>• <i>port</i>: Physical port number of the interface.</li> </ul>                                                                                                  |
| Configuration Mode | <p>Current configuration mode running on this controller. Can be WAN mode or LAN mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| SECTION            | <p>Displays the following section alarms:</p> <ul style="list-style-type: none"> <li>• LOF—Number of Loss of Framing (LOF) errors on this connection section. LOF alarms are critical because they indicate that the link associated with this section is down.</li> <li>• LOS—Number of loss of signal (LOS) errors on this connection section. LOS alarms are critical because they indicate that the link associated with this section is down.</li> <li>• BIP(B1)—Number of bit interleaved parity (BIP) B1 errors on this section that exceeded the specified threshold.</li> </ul> |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LINE  | <p>Displays the following line alarms:</p> <ul style="list-style-type: none"><li>• AIS—Number of AIS errors on this line. AIS alarms are critical because they indicate that the line is down.</li><li>• RDI—Remote defect indication.<ul style="list-style-type: none"><li>◦ Line remote defect indication is reported by the downstream LTE when it detects LOF4, LOS5, or AIS6.</li><li>◦ Path remote defect indication is reported by the downstream PTE when it detects a defect on the incoming signal.</li></ul></li><li>• FEBE—Number of far-end block errors (FEBE) on this line. Line FEBE errors are accumulated from the M0 or M1 byte, and are reported when the downstream LTE detects BIP7 (B2) errors.</li><li>• BIP(B2)—Number of bit interleaved parity (BIP) B2 errors on this line that exceeded the specified threshold.</li></ul> |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PATH  | <p>Displays the following path alarms:</p> <ul style="list-style-type: none"> <li>• AIS—Number of AIS errors on this path. AIS alarms are critical because they indicate that the line associated with this path is down.</li> <li>• RDI—Number of RDI errors on this path.</li> <li>• FEBE—Number of FEBE errors on this path. Path FEBEs are accumulated from the G1 byte, and are reported when the downstream PTE detects BIP (B3) errors.</li> <li>• BIP(B2)—Number of bit interleaved parity (BIP) errors on this path that exceeded the specified threshold.</li> <li>• LOP—Number of loss of pointer (LOP) errors on this path. Path LOPs are reported as a result of an invalid pointer (H1, H2) or an excess number of new data flag enabled indications.</li> <li>• NEWPTR—Inexact count of the number of times the SONET framer has validated a new SONET pointer value (H1, H2).</li> <li>• PSE—Inexact count of the number of times the SONET framer has detected a positive stuff event (PSE) in the received pointer (H1, H2).</li> <li>• NSE—Inexact count of the number of times the SONET framer has detected a negative stuff event in the received pointer (H1, H2).</li> </ul> <p><b>Note</b> For Cisco IOS XR software release 3.5.0, the following fields display no errors: RDIFEBEBIP(B2)NEWPTRPSENSE</p> |

| Field                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WIS ALARMS                    | <p>Displays the following WAN Interconnect Sublayer (WIS) layer alarms:</p> <ul style="list-style-type: none"> <li>• SER—Number of Severely Errored Seconds (SER) errors</li> <li>• FELCDP—Number of Far End - Loss of Code-group Delineation - Path (FELCDP) errors</li> <li>• FEALSP—Number of Far End - AIS - Path (FEALSP) errors</li> <li>• WLOS—Number of WIS LOS (WLOS) errors.</li> <li>• PLCD—Number of Path Loss of Code-group Delineation (PLCD) errors</li> <li>• LFEBIP—Number of Line - Far End - BIP (LFEBIP) errors</li> <li>• PBEC—Number of Path - Block Error Counter (PBEC) errors</li> </ul> <p><b>Note</b> Alarms are applicable only when the controller is configured in WAN-PHY mode.</p> |
| Active Alarms[All defects]    | <p>Total number of currently active alarms on this interface.</p> <p><b>Note</b> Alarms are applicable only when the controller is configured in WAN-PHY mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Active Alarms[Highest Alarms] | <p>Total number of the most significant active alarms on this interface. These alarms are likely causing all other alarms on the interface.</p> <p><b>Note</b> Alarms are applicable only when the controller is configured in WAN-PHY mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Rx(K1/K2)                     | Total number of errored K1/K2 bytes from the Line OverHead (LOH) of the SONET frame that were received by this interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Tx(K1/K2)                     | Total number of errored K1/K2 bytes from the Line OverHead (LOH) of the SONET frame that were transmitted by this interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| S1S0                          | Number of errored payload pointer bytes on this interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| C2                            | Number of errored STS identifier (C1) bytes on this interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Field             | Description                                                                                                                                     |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| PATH TRACE BUFFER | Rx J1 trace buffer received from the far end. If the received data is valid it will be shown below the PATH TRACE BUFFER field.                 |
| Remote IP addr    | Byte string containing the IP address of the remote end of this connection. If the received data is invalid, this field displays no IP address. |
| BER thresholds    | BER threshold values of the specified alarms for a the 10-Gigabit Ethernet controller.                                                          |
| TCA thresholds    | TCA threshold values of the specified alarms for a the 10-Gigabit Ethernet controller.                                                          |



| Field     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| REGISTERS | <p>Displays output from the following registers in hexadecimal format:</p> <ul style="list-style-type: none"> <li>• P_FEFE—Total number of Far End Block Errors (FEFEs) that occurred on the path that is associated with this interface.</li> <li>• L_FE_BIP—Total number of far end BIP errors that occurred on this interface.</li> <li>• L_BIP—Total number of local BIP errors that occurred on this interface.</li> <li>• P_BEC—Total BIP error count (BEC) that occurred on the path that is associated with this interface.</li> <li>• S_BIP—Total number of far end BIP errors that occurred on the current section.</li> <li>• J1-Rx0—Characters from far end IPV4 address string.</li> <li>• J1-Rx1—Characters from far end IPV4 address string.</li> <li>• J1-Rx2—Characters from far end IPV4 address string.</li> <li>• J1-Rx3—Characters from far end IPV4 address string.</li> <li>• J1-Rx4—Characters from far end IPV4 address string.</li> <li>• J1-Rx5—Characters from far end IPV4 address string.</li> <li>• J1-Rx6—Characters from far end IPV4 address string.</li> <li>• J1-Rx7—Characters from far end IPV4 address string.</li> </ul> <p><b>Note</b> The following Serdes-WIS HW registers are used to debug counters and can be cleared only by power cycling the hardware: P_FEBEL_FE_BIPL_BIPP_BECS_BIP. The J1-Rx registers (J1-Rx0 through J1-Rx7) comprise the raw 16 bytes of data received from the Rx J1 Path Trace Buffer, and are used to debug IPV4 address sent from far end.</p> |

| Field                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Internal Information | <p>Displays the following internal information for the interface:</p> <ul style="list-style-type: none"> <li>• <b>Operational Mode</b>—Current operation mode for this controller. Can be WAN mode or LAN mode. Use the Operational Mode field to detect whether the hardware was power cycled after a mode configuration change. If the Operational Mode field shows output that is different from the Configuration Mode field, then the hardware was not power cycled properly after a mode configuration change.</li> <li>• <b>Current Alarms</b>—Bit map of all currently active alarms on this controller. Use this information for debugging purposes.</li> </ul> <p><b>Note</b> Alarms are applicable only when the controller is configured in WAN-PHY mode.</p> |

The following example shows sample output from the **show controllers wanphy** command with the **alarms** keyword:

```
RP/0/RP0/CPU0:router# show controllers wanphy 0/3/4/0 alarms
```

```
Interface: wanphy0_3_4_0
Configuration Mode: WAN Mode
SECTION
 LOF = 1, LOS = 1, BIP(B1) = 2912
LINE
 AIS = 1, RDI = 0, FEBE = 949, BIP(B2) = 48562
PATH
 AIS = 1, RDI = 0, FEBE = 0, BIP(B2) = 0
 LOP = 0, NEWPTR = 0, PSE = 0, NSE = 0
WIS ALARMS
 SER = 9, FELCDP = 0, FEAISP = 0
 WLOS = 1, PLCD = 0
 LFEBIP = 47260, PBEC = 949

Active Alarms[All defects]:
Active Alarms[Highest Alarms]:
 Rx(K1/K2): N/A, Tx(K1/K2): N/A
 S1S0 = N/A, C2 = N/A
PATH TRACE BUFFER
Remote IP addr: 981.761.542.321
BER thresholds: N/A
TCA thresholds: N/A
```

The alarm information displayed in the **show controllers wanphy interface-id alarms** command output are described in [Table 102: show controllers wanphy Command Output Fields, on page 1144](#).

The following example shows sample output from the **show controllers wanphy** command with the **registers** keyword:

```
RP/0/RP0/CPU0:router# show controllers wanphy 0/3/4/0 registers
Interface: wanphy0_3_4_0

Configuration Mode: WAN Mode
```

```

REGISTERS
P_FEBC : 949
L_FE_BIP: 47260
L_BIP : 48562
P_BEC : 949
S_BIP : 2912
J1-Rx0 : 0x3136
J1-Rx1 : 0x352e
J1-Rx2 : 0x3234
J1-Rx3 : 0x332e
J1-Rx4 : 0x3132
J1-Rx5 : 0x3900
J1-Rx6 : 0x3138
J1-Rx7 : 0x372e
Internal Information
Operational Mode : WAN Mode
Current Alarms: 0x0

```

The registers displayed in the **show controllers wanphy interface-id registers** command output are described in [Table 102: show controllers wanphy Command Output Fields, on page 1144](#).

### Related Commands

| Command                                               | Description                                                                                                              |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <a href="#">clear controller wanphy, on page 1130</a> | Clears the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller.                                        |
| <a href="#">lanmode on, on page 1136</a>              | Configures a 10-Gigabit Ethernet WAN PHY controller to run in LAN mode for a 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA. |

## threshold sd-ber

To configure the threshold of the Signal Degrade (SD) Bit Error Rate (BER) that is used to trigger a signal degrade alarm, use the **threshold sd-ber** command in wanphy configuration mode. To return the Signal Degrade (SD) Bit Error Rate (BER) to the default value, use the no form of this command.

**threshold sd-ber** *exponent*

**no threshold sd-ber** *exponent*

### Syntax Description

|                 |                                                                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>exponent</i> | Value of 10 raised to the <i>n</i> power, where <i>n</i> is the exponent of 10, as in 10- <i>n</i> . Valid values are 3 to 9, meaning 10-3 to 10-9. |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

The default is 6, meaning (10-6).

### Command Modes

Wanphy configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

### Examples

The following example shows how to

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0/CPU0:router(config-wanphy)# threshold sd-ber 9
RP/0/RP0/CPU0:router(config-wanphy)#
```

**Related Commands**

| Command                                             | Description                                                                         |
|-----------------------------------------------------|-------------------------------------------------------------------------------------|
| <a href="#">report sd-ber, on page 1138</a>         | Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.                         |
| <a href="#">report sf-ber disable, on page 1140</a> | Disables SF BER reporting.                                                          |
| <a href="#">threshold sf-ber, on page 1154</a>      | Configures the threshold of the SF BER that is used to trigger a link state change. |

## threshold sf-ber

To configure the threshold of the Signal Failure (SF) Bit Error Rate (BER) that is used to trigger a link state change, use the **threshold sf-ber** command in wanphy configuration mode. To return the Signal Failure (SF) Bit Error Rate (BER) to the default value, use the no form of this command.

**threshold sf-ber** *exponent*

**no threshold sf-ber** *exponent*

### Syntax Description

|                 |                                                                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>exponent</i> | Value of 10 raised to the <i>n</i> power, where <i>n</i> is the exponent of 10, as in 10- <i>n</i> . Valid values are 3 to 9, meaning 10-3 to 10-9. |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

The default is 3, meaning (10-3).

### Command Modes

Wanphy configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

### Examples

The following example shows how to

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0/CPU0:router(config-wanphy)# threshold sf-ber 9
RP/0/RP0/CPU0:router(config-wanphy)#
```

**Related Commands**

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">report sd-ber, on page 1138</a>           | Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.                                      |
| <a href="#">report sf-ber disable, on page 1140</a>   | Disables SF BER reporting.                                                                       |
| <a href="#">show controllers wanphy, on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |

## wanmode on

To configure a 10-Gigabit Ethernet WAN PHY controller to run in WAN mode for the 10-Gigabit Ethernet LAN/WAN-PHY physical layer interface modules (PLIMs), use the **wanmode on** command in WAN physical controller configuration mode. To return the controller to the default, use the **no** form of this command.

**wanmode on**

**no wanmode on**

### Syntax Description

This command has no keywords or arguments.

### Command Default

The 10-Gigabit Ethernet WAN PHY controller default varies depending on the installed line card:

- For the 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA, the default mode is WAN mode. This command does not apply.
- For the 4-Port, 8-Port, 14-Port, and 20-Port 10-Gigabit Ethernet LAN/WAN-PHY PLIMs, the default mode is LAN mode.

### Command Modes

WAN physical controller configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **wanmode on** command to change from the default LAN mode state for all 10-Gigabit Ethernet LAN/WAN-PHY physical layer interface modules (PLIMs).



#### Note

This command does not apply to the 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA because the default state is WAN mode. Use the **lanmode on** and **no lanmode on** commands to change modes for that SPA.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |



## Examples

The following example shows how to enable WAN mode on a 10-Gigabit Ethernet WAN PHY controller for a 10-Gigabit Ethernet LAN/WAN-PHY PLIM:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config)# controller wanphy 0/6/0/0
RP/0/RP0/CPU0:Router(config-wanphy)# wanmode on
```

The following example shows how to disable WAN mode on a 10-Gigabit Ethernet WAN PHY controller and return that controller to the default WAN mode for 10-Gigabit Ethernet LAN/WAN-PHY PLIMs:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config)# controller wanphy 0/6/0/0
RP/0/RP0/CPU0:srt-crs1(config-wanphy)# no wanmode on
```

## Related Commands

| Command                                                                | Description                                                                                      |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy</a> , <a href="#">on page 1142</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |

 wanmode on



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