



Cisco ASR 9000 Series Aggregation Services Router Interface and Hardware Component Command Reference, Release 4.3.x

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Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Text Part Number: OL-28450-02



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Preface

This command reference describes the Cisco IOS XR Interfaces commands. The preface for the *Cisco ASR 9000 Series Aggregation Services Router Interface and Hardware Component Command Reference* contains the following sections:

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

Changes to this Document

This section lists the technical changes made to this document since it was first published.

Table 1: Changes to this Document

Revision	Date	Change Summary
OL-28450-02	May 2013	Republished with documentation updates for Cisco IOS XR Release 4.3.1 features.
OL-28450-01	December 2012	Initial Release of this document.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation*, at: <http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>.

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Dense Wavelength Division Multiplexing Commands on the Cisco ASR 9000 Series Router

This module provides command line interface (CLI) commands for configuring dense wavelength division multiplexing (DWDM) on the Cisco ASR 9000 Series Router.

- [admin-state, page 3](#)
- [controller dwdm, page 5](#)
- [g709 bdi-to-client-gais, page 7](#)
- [g709 fec, page 8](#)
- [g709 odu overhead tti, page 10](#)
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- [proactive](#), page 44
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- [show controller dwdm](#), page 54
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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| out-of-service}

no admin-state {in-service| out-of-service}

Syntax Description

in-service	Places the DWDM port in In Service (IS) state, to support all normal operation.
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.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 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. The DWDM cards will not operate without this configuration.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RSP0/CPU0:router(config-dwdm)# commit
```

The following example shows how to stop all operation on a DWDM port:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state out-of-service
```

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 3.9.0	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.

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/RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 3.9.0	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 sending a Generic Alarm Indication Signal (GAIS) pattern signal to client when a BDI is received:

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 bdi-to-client-gais
```

Related Commands	Command	Description
	show controller dwdm , on page 54	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.4 FEC.
standard	Enables standard FEC mode. This is the default.

Command Default

Standard FEC mode is enabled by default.

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.

To use this command, you must be in a user group associated with a task 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 **g709 fec** command can be used only when the DWDM controller port is in the out-of-service administrative state. 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.

Standard FEC is the default mode; therefore, if you use the **no g709 fec** command, standard 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/RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state out-of-service
RP/0/RSP0/CPU0:router(config-dwdm)# commit

RP/0/RSP0/CPU0:router(config-dwdm)# g709 fec standard
RP/0/RSP0/CPU0:router(config-dwdm)# commit
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RSP0/CPU0:router(config-dwdm)# commit
```

Related Commands

Command	Description
admin-state, on page 3	Configures the transport administration state on a DWDM port.
show controller dwdm, on page 54	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
g709 bdi-to-client-gais, on page 7	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 3.9.0	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 the expected TTI string:

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 odu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm , on page 54	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| lck| oci| ptim| tim} disable

no g709 odu report {ais| bdi| lck| oci| ptim| tim} disable

Syntax Description

ais	Alarm indication signal reporting status.
bdi	Backward defect indication reporting status.
lck	Upstream connection locked reporting status.
oci	Open connection indication error reporting status.
ptim	Payload type identifier mismatch 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 3.9.0	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 disable ODU reporting for OCI:

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 odu report oci disable
```

Related Commands

Command	Description
show controller dwdm , on page 54	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} *tti-string*

no g709 otu 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 string. A maximum of 64 characters is allowed.

Command Default

No TTI string is configured

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	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.

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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 otu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm , on page 54	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 {bdi| fecmismatch| iae| lof| lom| los| sd-ber| sf-ber| tim} disable

no g709 otu report {bdi| fecmismatch| iae| lof| lom| los| sd-ber| sf-ber| tim} disable

Syntax Description

bdi	Backward defect indication 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.
tim	Trace Identifier Mismatch reporting status.

Command Default

Reporting is enabled for all keywords.

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 disable OTU reporting for IAE:

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 otu report iae disable
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 ($10^{-bit-error-rate}$). 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 ($10^{-bit-error-rate}$). 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 3.9.0	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 set the signal fail BER rate to be 5:

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
```

```
RP/0/RSP0/CPU0:router(config-dwdm)# g709 otu threshold sf-ber 5
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 3.9.0	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 GAIS to client when a TIM is received:

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 tim-to-client-gais
```

Related Commands	Command	Description
	show controller dwdm , on page 54	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

Usage Guidelines To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 tti-processing
```

Related Commands

Command	Description
show controller dwdm , on page 54	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 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 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# log signal LogFile1
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 3.9.0	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 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/RSP0/CPU0:router (config) # controller dwdm 0/0/0/0
```



```
RP/0/RSP0/CPU0:router(config-dwdm)# loopback internal
```

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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# network connection id 1/1/1/1
```

Related Commands

Command	Description
network port id, on page 28	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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# network port id 1/0/1/1
```

Related Commands

Command	Description
network connection id, on page 26	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 3.9.0	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.

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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min fec report uc-words enable
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 3.9.0	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.

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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min fec threshold uc-words 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 61	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 3.9.0	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.

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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min optics report opt max-tca enable
```

Related Commands

Command	Description
show controller dwdm pm, on page 61	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 3.9.0	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.

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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min optics threshold opt max 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 61	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.

- **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 3.9.0	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.

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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min otn report esr-pm-fe enable
```

Related Commands

Command	Description
show controller dwdm pm, on page 61	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-parameter* enable

no pm {15-min| 24-hour} otn threshold *otn-parameter* 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

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.

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 configure an OTN layer performance monitoring threshold for path monitoring errored seconds ratio (ESR-PM):

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min otn threshold esr-pm-ne 500000
```

Related Commands	Command	Description
	show controller dwdm pm, on page 61	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 4.0.0	This command was introduced.
Release 4.2.3	Support for Proactive protection feature was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
```

```
RP/0/RSP0/CPU0:router(config-dwdm)# proactive
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 4.0.0	This command was introduced.
Release 4.2.3	Support for proactive revert threshold command was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router# config  
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1  
RP/0/RSP0/CPU0:router(config-dwdm)# proactive revert threshold 1 9
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 4.0.0	This command was introduced.
	Release 4.2.3	Support for proactive protection was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines	To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive revert window 100000
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 4.0.0	This command was introduced.
Release 4.2.3	Support for proactive trigger threshold command was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive trigger threshold 1 9
```

Related Commands

Command	Description
show controller dwdm, on page 54	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 4.0.0	This command was introduced.
Release 4.2.3	Support for proactive trigger window command was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive trigger window 10000
```

Related Commands

Command	Description
show controller dwdm, on page 54	Displays optical parameters, G.709 alarms and counters, and register and module information for 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]| 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.
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 3.9.0	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
interface	read
sonet-sdh	read

Examples

The following example shows sample output from the **show controllers dwdm g709** command:

```
RP/0/RSP0/CPU0:Router# show controller dwdm 0/5/0/0 g709
```

```
Thu Jul 1 18:34:20.052 UTC
```

```
G709 Status
```

```
OTU
```

```

      LOS = 0          LOF = 0          LOM = 0
      BDI = 0          IAE = 1          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: Standard FEC (Default)
```

```

      EC(current second) = 0          EC = 0          UC = 0
      pre-FEC BER < 9.00E-11         Q > 6.45        Q Margin > 7.52

```

```
Remote FEC Mode: Standard FEC
```

```
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 O
```

```
CI LCK PTIM ODU-TIM FECMISMATCH
```

```
BER Thresholds: OTU-SF = E-3 OTU-SD = E-6
```

```
Connectivity Info
```

```

      Network Port ID: Not Configured
      Network Connection ID: Not Configured

```

```

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

```

This table describes selected fields from the **show controllers dwdm** command output.

Table 2: 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 1.4, or Standard FEC (Default).
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.
Loopback	Loopback status. Indicates whether or not loopback is enabled and the type of loopback enabled.

Field	Description
LOS	Number of OTU loss of signal (LOS) alarms. 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.
Operational Mode	Indicates whether the tunable dispersion compensator (TDC) operational mode option is set to Auto or Manual.

Field	Description
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 3: show controllers dwdm optics Command Output Field Descriptions](#), on page 59 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/RSP0/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:

```
RP/0/RSP0/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 3: 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.
RX Power	Actual optical power at the RX port.
RX LOS Threshold	Receive loss of signal threshold. If the receive optical power is less than or equal to this 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/RSP0/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

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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 4: 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 3	Configures the transport administration state on a DWDM port.
show controller dwdm pm, on page 61	Displays performance monitoring information for 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 3.9.0	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
interface	read
sonet-sdh	read

Examples

The following examples show sample output for a DWDM controller:

```
RP/0/RSP0/CPU0:Router# show controller dwdm 0/5/0/0 pm interval 15-min fec 0
Thu Jul 1 18:58:09.353 UTC
```

```
g709 FEC in the current interval [18:45:00 - 18:58:09 Thu Jul 1 2010]
  EC-BITS      : 0          Threshold : 0          TCA(enable) : NO
  UC-WORDS    : 0          Threshold : 0          TCA(enable) : NO
```

```
RP/0/RSP0/CPU0:Router# show controller dwdm 0/5/0/0 pm history 15-min
Thu Jul 1 18:59:04.585 UTC
```

```
g709 OTN in the current interval [18:45:00 - 18:59:04 Thu Jul 1 2010]
  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 : 0          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     : 0          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 [18:45:00 - 18:59:04 Thu Jul 1 2010]
EC-BITS       : 0          Threshold : 0          TCA(enable)  : NO
UC-WORDS      : 0          Threshold : 0          TCA(enable)  : NO

Optics in the current interval [18:45:00 - 18:59:04 Thu Jul 1 2010]
      MIN      AVG      MAX Threshold TCA Threshold TCA
      (min)    (enable) (max)  (enable)
LBC[ mA ] : 17210 17542 17662 0 NO 0 NO
OPT[ dBm ] : -1.46 -1.46 -1.46 0.00 NO 0.00 NO
OPR[ dBm ] : -31.67 -31.66 -31.65 0.00 NO 0.00 NO

g709 OTN in interval 1 [18:30:00 - 18:45:00 Thu Jul 1 2010]
ES-SM-NE      : 0          ES-SM-FE      : 0
ESR-SM-NE     : 0          ESR-SM-FE     : 0
SES-SM-NE     : 0          SES-SM-FE     : 0
SESR-SM-NE    : 0          SESR-SM-FE    : 0
UAS-SM-NE     : 0          UAS-SM-FE     : 0
BBE-SM-NE     : 0          BBE-SM-FE     : 0
BBER-SM-NE    : 0          BBER-SM-FE    : 0
FC-SM-NE      : 0          FC-SM-FE      : 0
ES-PM-NE      : 0          ES-PM-FE      : 0
ESR-PM-NE     : 0          ESR-PM-FE     : 0
SES-PM-NE     : 0          SES-PM-FE     : 0
SESR-PM-NE    : 0          SESR-PM-FE    : 0
UAS-PM-NE     : 0          UAS-PM-FE     : 0
BBE-PM-NE     : 0          BBE-PM-FE     : 0
BBER-PM-NE    : 0          BBER-PM-FE    : 0
FC-PM-NE      : 0          FC-PM-FE      : 0

g709 FEC in interval 1 [18:30:00 - 18:45:00 Thu Jul 1 2010]
EC-BITS       : 0          UC-WORDS      : 0

Optics in interval 1 [18:30:00 - 18:45:00 Thu Jul 1 2010]
      MIN      AVG      MAX
LBC[ mA ] : 17210 17526 17662
OPT[ dBm ] : -1.46 -1.46 -1.46
OPR[ dBm ] : -31.67 -31.67 -31.66

g709 OTN in interval 2 [18:15:00 - 18:30:00 Thu Jul 1 2010]
ES-SM-NE      : 0          ES-SM-FE      : 0
ESR-SM-NE     : 0          ESR-SM-FE     : 0
SES-SM-NE     : 0          SES-SM-FE     : 0
SESR-SM-NE    : 0          SESR-SM-FE    : 0
UAS-SM-NE     : 0          UAS-SM-FE     : 0
BBE-SM-NE     : 0          BBE-SM-FE     : 0
BBER-SM-NE    : 0          BBER-SM-FE    : 0
.
.
.

```

This table describes selected fields from the **show controllers dwdm pm** command output.

Table 5: 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.
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.

Field	Description
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).

Field	Description
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).
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).

Field	Description
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).

 `show controller dwdm pm`



Ethernet Interface Commands on the Cisco ASR 9000 Series Router

This module provides command line interface (CLI) commands for configuring Ethernet interfaces on the Cisco ASR 9000 Series Router.

- [carrier-delay, page 71](#)
- [clear lldp, page 73](#)
- [clear mac-accounting \(Ethernet\), page 75](#)
- [flow-control, page 77](#)
- [interface \(Ethernet\), page 79](#)
- [lldp, page 81](#)
- [lldp \(interface\), page 82](#)
- [lldp holdtime, page 83](#)
- [lldp reinit, page 85](#)
- [lldp timer, page 87](#)
- [lldp tlv-select disable, page 88](#)
- [loopback \(Ethernet\), page 90](#)
- [mac-accounting, page 92](#)
- [mac-address \(Ethernet\), page 94](#)
- [negotiation auto, page 96](#)
- [packet-gap non-standard, page 97](#)
- [show controllers \(Ethernet\), page 98](#)
- [show lldp, page 100](#)
- [show lldp entry, page 102](#)
- [show lldp errors, page 104](#)
- [show lldp interface, page 106](#)

- [show lldp neighbors](#), page 108
- [show lldp traffic](#), page 111
- [show mac-accounting \(Ethernet\)](#), page 113
- [small-frame-padding](#), page 115
- [speed \(Fast Ethernet\)](#), page 116

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 3.7.2	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 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

This example shows how to delay the processing of hardware link down notifications:

```
RP/0/RSP0/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/RSP0/CPU0:router(config-if)# carrier-delay up 100 down 100
```

Related Commands

Command	Description
dampening , on page 473	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router# clear lldp counters
RP/0/RSP0/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
```

clear lldp

```
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/RSP0/CPU0:router# clear lldp table
RP/0/RSP0/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 108	Displays information about LLDP neighbors.
show lldp traffic, on page 111	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 4.1.1	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
interface	read, write
basic-services	read, write

Examples

This example shows how to clear all MAC accounting statistics for the TenGigE port at 1/0/0/1:

```
RP/0/RSP0/CPU0:router# clear mac-accounting TenGigE 0/1/5/0 location 1/0/0/1
```

Related Commands

Command	Description
mac-accounting , on page 92	Generates accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces.
show mac-accounting (Ethernet) , on page 113	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 3.7.2	This command was first introduced.
Release 4.2.3	This command was supported on 1 Gigabit Ethernet optical and copper SFPs.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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

This 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/RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RSP0/CPU0:router(config-if)# flow-control ingress
```

Related Commands

Command	Description
show interfaces , on page 490	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| TenGigE} *interface-path-id*

no interface {GigabitEthernet| TenGigE} *interface-path-id*

Syntax Description

GigabitEthernet	Specifies or creates a Gigabit Ethernet (1000 Mbps) 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 3.7.2	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.

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

This example shows how to enter interface configuration mode for a Gigabit Ethernet interface:

```
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet 0/4/0/0  
RP/0/RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
show interfaces , on page 490	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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

This example shows how to enable LLDP globally on the router:

```
RP/0/RSP0/CPU0:router(config)# lldp
```

Related Commands

Command	Description
show lldp , on page 100	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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

This example shows how to enter LLDP configuration mode from Ethernet interface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lldp
RP/0/RSP0/CPU0:router(config-lldp)#
```

Related Commands

Command	Description
interface (Ethernet) , on page 79	Specifies or creates an Ethernet interface and enters interface configuration mode.
lldp , on page 81	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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

This example shows how to change the default hold time to 1 minute:

```
RP/0/RSP0/CPU0:router(config)# lldp holdtime 60
```

Related Commands

Command	Description
lldp , on page 81	Enables LLDP globally for both transmit and receive operation on the system.

Command	Description
show lldp, on page 100	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router(config)# lldp reinit 4
```

Related Commands

Command	Description
lldp , on page 81	Enables LLDP globally for both transmit and receive operation on the system.

Command	Description
show lldp, on page 100	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router(config)# lldp timer 60
```

Related Commands

Command	Description
lldp, on page 81	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 100	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	tlv-name 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 4.1.0 This command was introduced.

Usage Guidelines	To use this command, you must be in a user group associated with a task 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/RSP0/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 3.7.2	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 **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/RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0  
RP/0/RSP0/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}

no 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 4.1.1	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 **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

This example shows how to enable MAC accounting for the source MAC address on the ingress direction:

```
RP/0/RSP0/CPU0:router#configure
RP/0/RSP0/CPU0:router#interface bundle-ether <bundle-id>
```

```
RP/0/RSP0/CPU0:router(config-if)# mac-accounting ingress
```

This example shows how to enable MAC accounting for the source MAC address on the egress direction:

```
RP/0/RSP0/CPU0:routerconfigure
RP/0/RSP0/CPU0:routerinterface bundle-ether <bundle-id>
RP/0/RSP0/CPU0:router(config-if)# mac-accounting egress
```

**Note**

In order to view the mac-accounting statistics for the configured bundle interface, use the **show mac-accounting bundle-ether <bundle id>** command.

Related Commands

Command	Description
clear mac-accounting (Ethernet), on page 75	Clears MAC accounting statistics for an interface.
show mac-accounting (Ethernet), on page 113	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 3.7.2	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 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/RSP0/CPU0:router(config)# interface GigabitEthernet 0/1/5/0
```

```
RP/0/RSP0/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

Command History	Release	Modification
	Release 3.7.2	This command was first introduced.
	Release 4.2.3	The negotiation auto command was supported on 1 Gigabit Ethernet interfaces.

Usage Guidelines To use this command, you must be in a user group associated with a task 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	Task ID	Operations
	interface	read, write

Examples This example shows how to enable link autonegotiation on an interface:

```
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RSP0/CPU0:router(config-if)# negotiation auto
```

This example shows how to disable link autonegotiation on an interface:

```
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RSP0/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 802.3 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 802.3 specification.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.7.2	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 802.3 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

This example shows how to change the packet interval for traffic on an interface from standard to nonstandard:

```
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RSP0/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| TenGigE} interface-path-id [all| bert| internal| mac| phy| stats| xgxs]
```

Syntax Description

{ GigabitEthernet TenGigE }	Specifies the type of Ethernet interface whose status and configuration information you want to display. Enter GigabitEthernet or 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.
all	Displays detailed information for the specified interface.
bert	Displays BERT status information for the interface.
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 3.7.2	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.

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

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	<table><tr><th>Release</th><th>Modification</th></tr><tr><td>Release 4.1.0</td><td>This command was introduced.</td></tr></table>	Release	Modification	Release 4.1.0	This command was introduced.
Release	Modification				
Release 4.1.0	This command was introduced.				

Usage Guidelines

To use this command, you must be in a user group associated with a task 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	<table><tr><th>Task ID</th><th>Operation</th></tr><tr><td>ethernet-services</td><td>read</td></tr></table>	Task ID	Operation	ethernet-services	read
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/RSP0/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/RSP0/CPU0:router# show lldp
Wed Apr 13 06:42:48.221 DST
% LLDP is not enabled
```

Related Commands

Command	Description
lldp, on page 81	Enables LLDP globally for both transmit and receive operation on the system.
lldp timer, on page 87	Specifies the LLDP packet rate.
lldp holdtime, on page 83	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 85	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 4.1.0	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task 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/RSP0/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:
```

```
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 81	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/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 81	Enables LLDP globally for both transmit and receive operation on the system.
show lldp traffic, on page 111	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/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 6: 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 81	Enables LLDP globally for both transmit and receive operation on the system.
lldp (interface) , on page 82	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/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 7: 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/RSP0/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
```

show lldp neighbors

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 81	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp, on page 73	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 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/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 8: 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 81	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp , on page 73	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 4.1.1	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.

For the *interface-path-id* argument, use these 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 the output from the **show mac-accounting** command, which displays MAC accounting statistics on the specified interface:

```
RP/0/RSP0/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 9: 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 75	Clears MAC accounting statistics for an interface.
mac-accounting , on page 92	Generates accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces.

small-frame-padding

To enable small frame padding on physical interfaces, use the **small-frame-padding** command in the interface configuration mode. To disable small frame padding, use the **no** form of this command.

small-frame-padding *interface-path-id*

nosmall-frame-padding

Syntax Description	<i>interface-path-id</i> Physical interface type.	
Command Default	None	
Command Modes	Interface Configuration mode	
Command History	Release	Modification
	Release 4.3.1	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

This command is applicable for all physical interfaces on all types of Cisco ASR 9000 Series Router line cards except Cisco ASR 9000 Ethernet line cards.

Task ID	Task ID	Operation
	interface	read, write

Examples This example shows how to use the small-frame-padding command:

```
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet 0/4/0/0
RP/0/RSP0/CPU0:router(config-if)# small-frame-padding
```

speed (Fast Ethernet)

To configure the speed for a Fast Ethernet interface, enter the **speed** command in interface configuration mode. To return the system to autonegotiate speed, use the **no** form of this command.

```
speed {10| 100| 1000}
no speed
```

Syntax Description

10	Configures the interface to transmit at 10 Mbps.
100	Configures the interface to transmit at 100 Mbps.
1000	Configures the interface to transmit at 1000 Mbps (1 Gbps).

Command Default

If autonegotiation is enabled on an interface, the default speed is negotiated.
If autonegotiation is disabled on an interface, the default speed is the maximum speed allowed on the interface.

Command Modes

Interface configuration

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.



Note

The **speed** command is available on Management Ethernet interfaces and Fast Ethernet interfaces only.



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.

**Note**

The **speed** configuration is supported for 1 Gigabit Ethernet copper SFPs and not supported for 1 Gigabit Ethernet optical SFPs.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure the Fast Ethernet interface to transmit at one gigabit:

```
RP/0/RSP0/CPU0:router(config)# interface FastEthernet 0/0/2/0  
RP/0/RSP0/CPU0:router(config-if)# speed 1000
```

speed (Fast Ethernet)



Ethernet OAM Commands on the Cisco ASR 9000 Series Router

This module provides command line interface (CLI) commands for configuring Ethernet Operations, Administration, and Maintenance (EOAM) on the Cisco ASR 9000 Series Router.

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- [action critical-event, page 125](#)
- [action discovery-timeout, page 127](#)
- [action dying-gasp, page 129](#)
- [action high-threshold, page 131](#)
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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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action capabilities-conflict log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action critical-event log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action discovery-timeout log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action dying-gasp log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action high-threshold disable
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
```

```
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action remote-loopback log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action session-down log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
```

```
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action session-up log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action uni-directional link-fault log
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
(config-if-eoam)# action wiring-conflict error-disable-interface
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	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). For loss measurements, the size of each bin in percentage points (range 1-100). 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.
For loss measurements, the default is aggregation disabled.

Command Modes

SLA profile statistics configuration (config-sla-prof-stat-cfg)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.3.0	The measurement statistics for Y.1731 Synthetic Loss Measurement (SLM) was included.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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).

For synthetic loss 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 25 for loss measurements yields 4 bins of statistics for these sample ranges:

- Bin 1—Samples with loss ranges 0 to < 25 percentage points.
- Bin 2—Samples with loss ranges greater than or equal to 25 and < 50 percentage points.
- Bin 3—Samples with loss ranges greater than or equal to 50 and < 75 percentage points.
- Bin 4—Samples with loss ranges greater than or equal to 75 and < 100 percentage points.

**Note**

For delay and jitter measurements (round-trip or one-way), the lower bound of the first bin is zero, and the last bin is effectively of infinite width. If aggregation is disabled, each individual delay value is stored. For loss measurements, the lower bound of the first bin is zero, and the upper bound of the last bin is 100. The last bin may be wider than the other bins. If aggregation is disabled, each calculated FLR value is stored.

**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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S1 bridge group BG1 bridge-domain BD2
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# ais transmission interval 1m cos 7
```

Related Commands

Command	Description
log ais, on page 242	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 147	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais, on page 302	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 310	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)# ais transmission up interval 1m cos 7
```

Related Commands

Command	Description
ais transmission, on page 145	Configures AIS transmission for a CFM domain service.
log ais, on page 242	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
show ethernet cfm interfaces ais, on page 302	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 310	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 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 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 151](#) 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RSP0/CPU0:router(config-sla-prof-stat-cfg)# buckets archive 50
```

Related Commands

Command	Description
buckets size, on page 151	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 3.9.0	This command was introduced.
Release 4.3.0	The per-probe keyword was deprecated.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 277, [send \(SLA\)](#), on page 290, and [schedule \(SLA\)](#), on page 286 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RSP0/CPU0:router(config-sla-prof-stat-cfg)# buckets size 100 per-probe
```

Related Commands

Command	Description
buckets archive, on page 149	Configures the number of buckets to store in memory.
probe, on page 277	Enters SLA profile probe configuration mode.
schedule (SLA), on page 286	
send (SLA), on page 290	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 3.7.2	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
ethernet-services	execute

Examples

The following example shows how to clear all the CFM CCM learning databases on all interfaces:

```
RP/0/RSP0/CPU0:router# clear ethernet cfm ccm-learning-database location all
```

Related Commands

Command	Description
show ethernet cfm ccm-learning-database , on page 298	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 3.7.2	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
ethernet-services	execute

Examples

The following example shows how to clear all the CFM counters from all interfaces:

```
RP/0/RSP0/CPU0:router# clear ethernet cfm interface statistics location all
```

Related Commands

Command	Description
show ethernet cfm interfaces statistics, on page 305	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 3.7.2	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 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/RSP0/CPU0:router# clear ethernet cfm local meps all
```

Related Commands

Command	Description
show ethernet cfm local meps, on page 310	Displays information about local MEPs.

clear ethernet cfm offload

To trigger the re-application of Maintenance End Points (MEPs) that have been disabled due to exceeding offload resource limits, use the **clear ethernet cfm offload** command in the EXEC mode.



Note

This command does not clear any counters or stored statistics for the MEPs.

clear ethernet cfm offload*location**node-id*

Syntax Description

location <i>node-id</i>	(Optional) Specifies the location for which the re-application of MEPs needs to be triggered.

Command Default

The default action is to clear the CFM offload information for all nodes.

Command Modes

EXEC

Command History

Release	Modification
Release 4.3.1	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	Operation
ethernet-services	execute

Examples

This example shows how to execute the **clear ethernet cfm offload** command:

```
RP/0/RSP0/CPU0:router# clear ethernet cfm offload
```

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 3.7.2	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.

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.

 clear ethernet cfm peer meps**Task ID**

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all peer MEPs:

```
RP/0/RSP0/CPU0:router# clear ethernet cfm peer meps all
```

Related Commands

Command	Description
show ethernet cfm peer meps , on page 315	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 3.7.2	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
ethernet-services	execute

Examples

The following example shows how to clear all ethernet cfm traceroute-cache:

```
RP/0/RSP0/CPU0:router# clear ethernet cfm traceroute-cache all
```

Related Commands

Command	Description
traceroute cache, on page 387	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 324	Displays the contents of the traceroute cache.

clear ethernet lmi interfaces

To clear Ethernet LMI statistics on one or all interfaces, use the **clear ethernet lmi interfaces** command in EXEC configuration mode.

clear ethernet lmi interfaces {*type interface-path-id* | **all**}

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.
all	Specifies clearing of LMI statistics for all Ethernet interfaces running the E-LMI protocol.

Command Default

None

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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	execute

Examples

The following example shows how to clear E-LMI statistics for Gigabit Ethernet interface 0/0/0/0:

```
RP/0/RSP0/CPU0:router# clear ethernet lmi interfaces GigabitEthernet 0/0/0/0
```

 clear ethernet lmi interfaces**Related Commands**

Command	Description
show ethernet lmi interfaces, on page 331	Displays E-LMI information for an interface, including protocol status and error and event statistics.

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 3.7.2	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
ethernet-services	execute

Examples

The following example shows how to clear the packet counters on a specific interface:

```
RP/0/RSP0/CPU0:router# clear ethernet oam statistics interface gigabitethernet 0/1/5/1
```

Related Commands

Command	Description
show ethernet oam statistics, on page 352	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 349	

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 151](#) 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/RSP0/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/RSP0/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/RSP0/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 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 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 151](#) 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/RSP0/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/RSP0/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/RSP0/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 167	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 203	Executes an on-demand Ethernet SLA operation probe for CFM delay measurement.
ethernet sla on-demand operation type cfm-loopback probe, on page 210	Executes an on-demand Ethernet SLA operation probe for CFM loopback measurements
show ethernet sla operations, on page 356	Displays information about configured Ethernet SLA operations.

Command	Description
show ethernet sla statistics, on page 359	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 <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 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 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 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 151](#) 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/RSP0/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/RSP0/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/RSP0/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/RSP0/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/RSP0/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 151	Configures the size of the buckets in which statistics are collected.

clear ethernet udd statistics

To remove the statistics of state machine transitions and packets exchanged on an interface running UDLD protocol, use the **clear ethernet udd statistics** command in the ethernet interface configuration mode.

clear ethernet udd statistics[*interface type* |**unaccounted-drops** |**all**]

Syntax Description

interfacetype	(Optional) Clears information about the specified interface type. If an interface is specified, only the interface-specific counters are shown and not the node counters.
unaccounted-drops	(Optional) Clears information for only the node counters.
all	(Optional) Clears all the udd statistics.

Command Default

None

Command Modes

Ethernet Interface 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
ethernet-services	read

Examples

This example shows how to run the **clear ethernet udd statistics** command for an interface:

```
RP/0/RSP0/CPU0:router#clear ethernet udd statistics interface GigabitEthernet 0/1/0/1
```

Related Commands

Command	Description
show ethernet udd statistics, on page 370	Displays statistics on state machine transitions and packets sent and received for an UDD interface.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# connection timeout 20
```


Related Commands

Command	Description
action discovery-timeout, on page 127	Configures what action is taken on an interface when a connection timeout occurs.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 346	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam interfaces, on page 349	

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

Related Commands

Command	Description
show ethernet cfm peer meps , on page 315	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: • 10ms: 10 milliseconds • 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.
Release 4.3.1	The continuity-check interval command was updated to allow CCM time interval of 10ms.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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

This 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
B1
RP/0/RSP0/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

Related Commands

Command	Description
show ethernet cfm traceroute-cache , on page 324	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm mep domain Dm1 service Sv1 mep-id 1
RP/0/RSP0/CPU0:router(config-if-cfm-mep)# cos 7
```

Related Commands

Command	Description
ethernet cfm (interface) , on page 195	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 (#)

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.

**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

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/RSP0/CPU0:router# debug ethernet cfm packets hexdump
```

```
RP/0/RSP0/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/RSP0/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/RSP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX: CCM: MAID: MDID String 'dom4',
SMAN String 'ser4'
RP/0/RSP0/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/RSP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX: CCM: Port status: Up, interface
status Up
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX: Raw Frame:
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX: 0x40010546 00000001 00100404
646F6D34 02047365 72340000 00000000 00000000
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX: 0x00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX: 0x00000000 00000000 00000200
01020400 01010100 05030768 707200
RP/0/RSP0/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/RSP0/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/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: CCM: MAID: MDID String 'foo',
SMAN String 'foo'
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: CCM: Sender ID: Chassis ID Local
'ios', Mgmt Addr <none>
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: CCM: Port status: Up, interface
status Up
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: Raw Frame:
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: 0x40018546 00000010 00010403
666F6F02 03666F6F 00000000 00000000 00000000
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: 0x00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000
RP/0/RSP0/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 187	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/RSP0/CPU0:router# debug ethernet cfm protocol-state
```

```
RP/0/RSP0/CPU0:May 29 14:41:49.966 : cfmd[150]: CFM: Created 1 local MEPs in PM and Engine
RP/0/RSP0/CPU0:May 29 14:41:49.967 : cfmd[150]: CFM: State changes notification for 1 EFPs
RP/0/RSP0/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/RSP0/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/RSP0/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 184	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)#
```

Related Commands

Command	Description
ethernet cfm (global), on page 193	Enters CFM configuration mode.
ethernet cfm (interface), on page 195	Enters interface CFM configuration mode.
mep domain, on page 258	Creates a MEP on an interface.
service, on page 293	
show ethernet cfm configuration-errors, on page 300	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 307	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 310	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 {**protection-switching**}

no efd

Syntax Description

protection-switching Enables protection switching, which causes high-priority notifications to be sent when peer MEPs specified for cross-check time out, or when CCMs are received with the RDI bit set.

Note The high-priority notifications only apply to MEPs that are offloaded. In the case of non-offloaded MEPs, enabling protection switching has no effect, and the command only enables EFD.

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.
Release 4.3.1	The protection-switching keyword was included.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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

This example shows how to enable EFD:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# efd
```

Related Commands

Command	Description
log efd, on page 251	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 296	Displays all interfaces that are shut down because of EFD.
show ethernet cfm local meps, on page 310	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 3.7.2	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
	ethernet-services	read, write

Examples The following example shows how to enter the CFM configuration mode.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)#
```

Related Commands	Command	Description
	domain , on page 189	
	ethernet cfm (interface) , on page 195	Enters interface CFM configuration mode.

Command	Description
show ethernet cfm configuration-errors, on page 300	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 307	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 310	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.
	Release 4.1.0	Support for subinterface configuration mode 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 enter interface CFM configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)#
```

Related Commands	Command	Description
	cos (CFM), on page 182	Configures the CoS for all CFM packets generated by the MEP on an interface.

Command	Description
ethernet cfm (global), on page 193	Enters CFM configuration mode.
mep domain, on page 258	Creates a MEP on an interface.
show ethernet cfm configuration-errors, on page 300	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 307	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 310	Displays information about local MEPS.

ethernet lmi

To enable Ethernet Local Management Interface (E-LMI) operation on an interface and enter interface Ethernet LMI configuration mode, use the **ethernet lmi** command in interface configuration mode. To disable Ethernet LMI and return to the default, use the **no** form of the command.

ethernet lmi

no ethernet lmi

Syntax Description This command has no keywords or arguments.

Command Default Ethernet LMI is disabled.

Command Modes Interface configuration (config-if)

Release	Modification
Release 4.1.0	This command was introduced.

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

Ethernet LMI is supported only on physical Ethernet interfaces.

Task ID	Operation
ethernet-services	read, write

Examples The following example shows how to enable Ethernet LMI on a Gigabit Ethernet interface and enter Ethernet LMI configuration mode:

```
RP/0/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)#
```

Command	Description
interface (Ethernet) , on page 79	Specifies or creates an Ethernet interface and enters interface configuration mode.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/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/RSP0/CPU0:router# ethernet oam loopback enable tengigabitethernet 0/6/1/0
```

Related Commands

Command	Description
remote-loopback, on page 282	Enables a remote loopback on the far end of an Ethernet OAM interface.
action remote-loopback, on page 133	Configures what action is taken on an interface when a remote-loopback event occurs.
snmp-server traps ethernet oam events, on page 375	
show ethernet oam configuration, on page 343	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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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 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 SLA configuration mode.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/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| cfm-delay-measurement-v0} 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 <i>number</i>	(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 <i>number</i> {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>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.
	Release 4.3.0	The cfm-delay-measurement-v0 option was included.

Usage Guidelines To use this command, you must be in a user group associated with a task 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/RSP0/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 167	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 169	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 356	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 359	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 cfm-delay-measurement-v0probe
[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	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 (#)

Command History	Release	Modification
	Release 4.0.0	This command was introduced.
	Release 4.3.0	The cfm-delay-measurement-v0 keyword was included.

Usage Guidelines To use this command, you must be in a user group associated with a task 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/RSP0/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 167	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 169	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 356	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 359	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

ethernet sla on-demand operation type cfm-synthetic-loss-measurement probe

To execute an on-demand Ethernet SLA operation probe for CFM synthetic loss measurement, use the **ethernet sla on-demand operation type cfm-synthetic-loss-measurement probe** command in EXEC mode.

```
ethernet sla on-demand operation type cfm-synthetic-loss-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}] synthetic
loss calculation packets number domain domain_name source interface type interface-path-id target
{mac-address H.H.H.H| mep-id id_number} statistics measure {one-way-loss-sd| one-way-loss-ds}
[aggregate {none| bins number width count}] [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 number { 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.
synthetic loss calculation packets <i>number</i>	Defines the number of packets that must be used to make each FLR calculation for synthetic loss measurements. It ranges from 10 to 12096000.
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</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-loss-ds—One-way loss statistics from destination to source. • one-way-loss-sd—One-way loss statistics from source to destination.

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>count</i>	Specifies the range of the samples to be collected within each bin in percentage points, from 1 to 100.
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 these ranges: • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours

for duration {seconds minutes hours}	(Optional) Specifies the length of the probe as a number of seconds, minutes, or hours, where <i>number</i> is in these 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 these 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 4.3.0	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	Operation
ethernet-services	execute

Examples

This example shows a minimum configuration, that specifies the local domain and source interface and target MEP, using these defaults:

- Send a burst once for a packet count of 100 and interval of 100 milliseconds .
- The number of packets to be used for FLR calculation is 100.
- Measure the one way loss statistics in both the directions .
- Aggregate statistics into one bin.
- Schedule now.
- Display results on the console.

```
RP/0/RSP0/CPU0:router#ethernet sla on-demand operation type cfm-synthetic-loss-measurement
probe
domain D1 source interface TenGigE 0/6/1/0 target mac-address 2.3.4
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 167	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 169	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 356	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 359	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

ethernet udd reset interface

To reset the UDLD protocol state for a specified interface or for all interfaces, use the **ethernet udd reset interface** command in the Ethernet Interface Configuration mode.

ethernet udd reset interface [*interface type* | **all**]

Syntax Description

interface type	(Optional) Specifies the interface type for which the UDLD protocol state needs to be reset.
all	(Optional) Resets the UDLD state for all interfaces.

Command Default

No default behavior or values

Command Modes

Ethernet Interface 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
ethernet-services	read

Examples

This example shows how to run the **ethernet udd reset interface** command:

```
RP/0/RSP0/CPU0:router# ethernet udd reset interface GigabitEthernet 0/10/0/11
```

ethernet uni id

To specify a name for the Ethernet User-Network Interface (UNI) link, use the **ethernet uni id** command in interface configuration mode.

ethernet uni id *name*

Syntax Description

<i>name</i>	Maximum of 64 characters to identify the Ethernet UNI link.

Command Default

No name is specified for the Ethernet UNI link.

Command Modes

Interface (config-if)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 UNI name should be unique among all UNIs that are part of a given Ethernet Virtual Connection (EVC).

When the Ethernet Local Management Interface (E-LMI) protocol is running on the UNI, the name specified in the **ethernet uni id** command is advertised by E-LMI to the Customer Edge (CE) device. It is also carried in Ethernet Connectivity Fault Management (CFM) Continuity Check Messages (CCMs) if there is an Up MEP on the UNI, and passed to E-LMI on the peer MEP so that it can be advertised to the remote CE device.

Task ID

Task ID	Operation
interface	read, write

Examples

The following example shows how to configure the UNI name called "PE1-CustA-Slot0-Port0" on Gigabit Ethernet interface 0/0/0/0:

```
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/0/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet uni id PE1-CustA-Slot0-Port0
```

Related Commands

Command	Description
interface (Ethernet), on page 79	Specifies or creates an Ethernet interface and enters interface configuration mode.

extension remote-uni disable

To disable transmission of the Cisco-proprietary Remote UNI Details information element in Ethernet LMI (E-LMI) STATUS messages, use the **extension remote-uni disable** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

extension remote-uni disable

no extension remote-uni disable

This command has no keywords or arguments.

Command Default

The Cisco-proprietary Remote UNI Details information element is sent in E-LMI STATUS messages.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 **extension remote-uni disable** command to have stricter conformance to the MEF 16 E-LMI specification for information elements in STATUS messages.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to disable transmission of the Cisco-proprietary Remote UNI Details information element:

```
RP/0/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# extension remote-uni disable
```

Related Commands

Command	Description
interface (Ethernet), on page 79	Specifies or creates an Ethernet interface and enters interface configuration mode.

Command	Description
ethernet lmi, on page 197	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.

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 threshold	Low threshold, in frames, that triggers a frame-period error event. The range is 0 to 1000000.
high threshold	(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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1  
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor  
RP/0/RSP0/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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor (config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame-seconds threshold low 10 high 900
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 240	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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame-seconds window 900000
```


Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 240	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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame threshold low 100 high 60000
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 240	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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame window 60
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 240	Enters Ethernet OAM link monitor configuration mode.

hello-interval

To specify the time interval between hello packets for an Ethernet OAM session, use the **hello-interval** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of the command.

hello-interval {100ms| 1s}

no hello-interval {100ms| 1s}

Syntax Description

100ms	Specifies a 100-millisecond interval between hello packets.
1s	(Interface Ethernet OAM configuration mode only) Specifies a 1-second interval between hello packets. This is the default.

Command Default

The default is 1 second.

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.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 set the hello interval to 100 milliseconds on a Gigabit Ethernet interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
```

```
RP/0/RSP0/CPU0:router(config-if)# ethernet oam  
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1  
RP/0/RSP0/CPU0:router(config-if-eoam)# hello-interval 100ms
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 349	

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
```



```
RP/0/RSP0/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

Related Commands

Command	Description
ais transmission , on page 145	Configures AIS transmission for a CFM domain service.
ais transmission up , on page 147	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais , on page 302	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps , on page 310	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

The following example shows how to enable logging of continuity check errors:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check errors

RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/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

The following example shows how to enable logging of continuity-check mep changes:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check mep changes
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/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 The following example shows how to enable logging of crosscheck errors:

```
RP/0/RSP0/CPU0:router# configure
```

log crosscheck errors

```

RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log crosscheck errors

```

```

RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log crosscheck errors

```

Related Commands

Command	Description
mep crosscheck, on page 255	Enters CFM MEP crosscheck configuration mode.
mep-id, on page 256	Enables crosscheck on a MEP.

log disable

To turn off syslog messages for Ethernet LMI (E-LMI) errors or events, use the **log disable** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

log {errors | events} disable

no log {errors | events} disable

Syntax Description

errors	Disables logging of E-LMI protocol and reliability errors.
events	Disables logging of significant E-LMI protocol events.

Command Default

E-LMI syslog messages are enabled for errors and events.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 statistics on E-LMI protocol and reliability errors and protocol events, use the **show ethernet lmi interfaces** command.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to disable logging of E-LMI protocol and reliability errors:

```
RP/0/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# log errors disable
```

The following example shows how to disable logging of E-LMI events:

```
RP/0/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# log events disable
```

Related Commands

Command	Description
interface (Ethernet), on page 79	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 197	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 331	Displays E-LMI information for an interface, including protocol status and error and event statistics.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log efd
```

Related Commands

Command	Description
efd , on page 191	Enables EFD on all down MEPs in a down MEPs service.
show efd interface , on page 296	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

The following example shows how to configure the maximum number of maintenance end points (MEPs) for a service:

```
RP/0/RSP0/CPU0:router# configure
```

```

RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# maximum-meps 4000

```

```

RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# maximum-meps 4000

```

Related Commands

Command	Description
domain , on page 189	
ethernet cfm (global) , on page 193	Enters CFM configuration mode.
ethernet cfm (interface) , on page 195	Enters interface CFM configuration mode.
service , on page 293	
show ethernet cfm configuration-errors , on page 300	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 307	Displays a list of local maintenance points.
show ethernet cfm local meps , on page 310	Displays information about local MEPS.
show ethernet cfm peer meps , on page 315	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

The following example shows how to enter CFM MEP crosscheck configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RSP0/CPU0:router(config-cfm-xcheck)#

RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RSP0/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

The following example shows how to statically define a maintenance end point (MEP) under a service, so that it can be crosschecked.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RSP0/CPU0:router(config-cfm-xcheck)# mep-id 10

RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RSP0/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 293](#) 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

Related Commands

Command	Description
ethernet cfm (interface) , on page 195	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors , on page 300	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
```

```
RP/0/RSP0/CPU0:router(config-if-eoam)# mib-retrieval
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 349	

mip auto-create

To enable the automatic creation of Maintenance Intermediate Points (MIPs) in a bridge domain or 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} {ccm-learning}

no mip auto-create {all| lower-mep-only}

Syntax Description

all	Enables automatic creation of MIPs on all interfaces.
lower-mep-only	[Optional] Enables automatic creation of MIPs only on interfaces with a MEP at a lower level.
ccm-learning	[Optional] Enables CCM learning for MIPs created in this service. This must be used only in services with a relatively long CCM interval of at least 100 ms. CCM learning at MIPs is disabled by default.

Command Default

None

Command Modes

CFM domain service configuration (config-cfm-dmn-svc) mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.3.1	The ccm-learning keyword was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 configured only for services associated with bridge domains or 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. For each interface, the algorithm, in brief, operates in this manner:

- The bridge-domain or cross-connect for the interface is found, and all services associated with that bridge-domain or 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 first selected by the algorithm.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to enable the automatic creation of MIPs for all interfaces in a bridge domain:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mip auto-create all
```

Related Commands

Command	Description
domain, on page 189	
ethernet cfm (global), on page 193	Enters CFM configuration mode.
service, on page 293	
show ethernet cfm configuration-errors, on page 300	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 307	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 310	Displays information about local MEPs.
show ethernet cfm peer meps, on page 315	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1
```



```
RP/0/RSP0/CPU0:router(config-if-eoam)# mode passive
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 349	

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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# monitoring disable
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
link-monitor, on page 240	Enters Ethernet OAM link monitor configuration mode.
profile (EOAM), on page 278	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam statistics, on page 352	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 349	

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 3.9.0	This command was introduced.
Release 4.0.0	The test pattern hex and pseudo-random 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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# packet size 9000
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# packet size 9000 test pattern hex 0xabcdabcd
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# commit
```

ping ethernet cfm

To send Ethernet connectivity fault management (CFM) loopback messages to a maintenance end point (MEP) or MAC address destination from the specified source MEP, and display a summary of the responses, use the **ping ethernet cfm** command in EXEC mode.

ping ethernet cfm domain *domain-name* **service** *service-name* {**mac-address** *mac*| **mep-id** *id*} **source** [**mep-id** *source-id*] **interface** *interface-path-id* [**cos** *cos-val*] [**count** *n*] [**frame-size** *size*] [**data-pattern** *hex*] [**interval** *seconds*] [**timeout** *time*]

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 points belong.
mac-address <i>mac</i>	6-byte ID number of the MAC address of the destination MEP.
mep-id <i>id</i>	Maintenance end point (MEP) ID number of the destination MEP. The range for MEP ID numbers is 1 to 8191.
source	Source information.
mep-id <i>source-id</i>	(Optional) Maintenance end point (MEP) ID number of the source MEP. The range for MEP ID numbers is 1 to 8191.
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.
cos <i>cos-val</i>	(Optional) Class of Service (CoS) value that identifies the class of traffic of the source MEP. The valid values are from 0 to 7.
count <i>n</i>	(Optional) Number of pings as an integer value. The default is 5.
frame-size <i>size</i>	(Optional) Size, as an integer, of the ping frames. Frames are padded to reach the specified size. The default is 0 (no padding).
data-pattern <i>hex</i>	(Optional) Hexadecimal value to be used as the data pattern for padding within a ping frame, when padding is required due to the frame-size configuration. The default is 0.
interval <i>seconds</i>	(Optional) Specifies, in seconds, the time between pings. The <i>n</i> argument is entered in seconds. The default is 1 second.

timeout <i>time</i>	(Optional) Timeout, in seconds, for the ping packet. The default is 2.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 3.7.2	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.

Before you can use this command, a local MEP must be configured for the domain and the interface.

The command displays the following information:

- Number of loopback message being sent
- Timeout period
- Domain name
- Domain level
- Service name
- Source MEP ID
- Interface
- Target MAC address
- MEP ID – If no MEP ID is specified, “No MEP ID specified” is displayed.
- Running time for the current ping operation to complete

**Note**

The remaining information is not displayed until the current ping operation is complete. If the user interrupts the operation during this time (by pressing control-C), the prompt is returned and no further information is displayed. However, all loopback messages continue to be sent.

- Success rate of responses received – displayed as a percentage followed by the actual number of responses
- The round trip time minimum/maximum/average in milliseconds
- Out-of-sequence responses – displayed as a percentage followed by the actual number of out-of-sequence responses when at least one response is received. An out-of-sequence response occurs if the first response does not correspond with the first message sent, or a subsequent response is not the expected next response after a previously received response.

- Bad data responses – displayed as a percentage followed by the actual number of bad data responses when at least one response is received. A bad data response occurs if the padding data in the response does not match the padding data that in the sent message. This can only happen if the sent message is padded using the **frame-size** option.
- Received packet rate – displayed in packets per second when at least two responses are received. This approximate rate of response is the time between the first response received and the last response received, divided by the total number of responses received.

Task ID

Task ID	Operations
basic-services	execute
ethernet-services	execute

Examples

The following example shows how to send an Ethernet CFM loopback message:

```
RP/0/RSP0/CPU0:router# ping ethernet cfm domain D1 service S1 mep-id 16 source
interface GigabitEthernet 0/0/0/0

Type escape sequence to abort.
Sending 5 CFM Loopbacks, timeout is 2 seconds -
Domain foo (level 2), Service foo
Source: MEP ID 1, interface GigabitEthernet0/0/0/0
Target: 0001.0002.0003 (MEP ID 16):
Running (5s) ...
Success rate is 60.0 percent (3/5), round-trip min/avg/max = 1251/1349/1402 ms
Out-of-sequence: 0.0 percent (0/3)
Bad data: 0.0 percent (0/3)
Received packet rate: 1.4 pps
```


polling-verification-timer

To set or disable the Metro Ethernet Forum (MEF) T392 Polling Verification Timer (PVT) for Ethernet Local Management Interface (E-LMI) operation, use the **polling-verification-timer** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

polling-verification-timer {*interval* | **disable**}

no polling-verification-timer {*interval* | **disable**}

Syntax Description

<i>interval</i>	Number of seconds in the range 5 to 30. The default is 15.
disable	Turns off the timer.

Command Default

The T392 Polling Verification Timer is set to 15 seconds.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 PVT specifies the allowable time between transmission of a STATUS message and receipt of a STATUS ENQUIRY from the Customer Edge (CE) device before recording an error. If the PVT expiration time is reached on consecutive packets for the number of times specified by the **status-counter** command without a STATUS ENQUIRY being received, the E-LMI protocol status is changed to Down.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

The following example shows how to set the MEF Polling Verification Timer for E-LMI to 30 seconds:

```
RP/0/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# polling-verification-timer 30
```

Related Commands

Command	Description
interface (Ethernet), on page 79	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 197	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 331	Displays E-LMI information for an interface, including protocol status and error and event statistics.

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 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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
```

```
RP/0/RSP0/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)

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.

Each profile may optionally have 1 probe submode.

Task ID	Operations
ethernet-services	read, write

Examples The following example shows how to enter the SLA profile probe configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 349	

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-delay-measurement-v0**}|**cfm-loopback**|**cfm-synthetic-loss-measurement**}

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-delay-measurement-v0: CFM delay measurement version 0 packets • cfm-loopback: CFM loopback packets • cfm-synthetic-loss-measurement: CFM synthetic loss measurement packets

Command Default

No default behavior or values

Command Modes

Ethernet SLA configuration (config-sla)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.3.0	The cfm-delay-measurement-v0 and cfm-synthetic-loss-measurement keyword was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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.

**Note**

You can configure the Ethernet SLA profile to use Y.1731 DMM frames. The restriction of 150 configured Ethernet SLA operations for each CFM MEP is removed not only for profiles using DMM frames, but also for profiles using the other supported Y.1731 frame types, such as loopback measurement and synthetic loss measurement. For interoperability purposes, it is still possible to configure profiles to use DMM v0 frames. This is done by specifying a type of **cfm-delay-measurement-v0** on the **profile(SLA)** command. The limit of 150 configured operations for each CFM MEP still applies in this case.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)#
```

remote-loopback

To enable a remote loopback on the far end of an Ethernet OAM interface, use the **remote-loopback** command in Ethernet OAM configuration or interface Ethernet OAM configuration mode. To return the interface to the default (disabled), use the **disable** keyword.

remote-loopback [disable]

Syntax Description

disable	Disables the remote loopback at the far end of the Ethernet OAM interface.

Command Default

Remote loopback 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 remote loopback is enabled on an Ethernet OAM interface, the OAM client advertises support for remote loopback to the peer.

When remote loopback is disabled (the default), only the enable form of the **remote-loopback** 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 remote loopback on a Gigabit Ethernet interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
```

```
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1  
RP/0/RSP0/CPU0:router(config-if-eoam)# remote-loopback
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
ethernet oam loopback, on page 199	Starts or stops a loopback at the remote end of an Ethernet OAM interface.
profile (EOAM), on page 278	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 349	

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# require-remote mode active
RP/0/RSP0/CPU0:router(config-eoam)# require-remote mib-retrieval
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/6/5/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# require-remote mode active disabled
RP/0/RSP0/CPU0:router(config-if-eoam)# require-remote mib-retrieval disabled
RP/0/RSP0/CPU0:router(config-if-eoam)# require-remote link-monitoring disabled
```

Related Commands

Command	Description
ethernet oam profile, on page 201	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 198	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 278	Attaches an Ethernet OAM profile to an interface.
action capabilities-conflict, on page 123	Configures what action is taken on an interface when a capabilities-conflict event occurs.
show ethernet oam configuration, on page 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 346	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam interfaces, on page 349	

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 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.

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:hh[: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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# schedule every week on Monday at 23:30 for 1 hour
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# schedule every day at 11:30 for 5 minutes
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# schedule every 2 hours first at 13:45:01
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# schedule every 6 hours for 2 hours
```


Related Commands

Command	Description
send (SLA) , on page 290	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 3.9.0	This command was introduced.
Release 4.3.0	The statistics measurement for Y.1731 Synthetic Loss Measurement was included.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# send burst every 60 seconds packet count 30
interval 1 second
RP/0/RSP0/CPU0:router(config-sla-prof-pb)#
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
```

send (SLA)

```
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# send burst once packet count 2 interval 1 second
```

```
RP/0/RSP0/CPU0:router(config-sla-prof-pb)#
```

```
RP/0/RSP0/CPU0:router# configure
```

```
RP/0/RSP0/CPU0:router(config)# ethernet sla
```

```
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
```

```
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
```

```
RP/0/RSP0/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* {**bridge group** *bridge-domain-group* **bridge-domain** *bridge-domain-name*| **down-meps**| **xconnect group** *xconnect-group-name* **p2p** *xconnect-name*} [**id** [**icc-based** *icc-string umc-string*] || [**string** *text*]] [**number** *number*]] [**vlan-id** *id-number*]] [**vpn-id** *oui-vpnid*]]

no service *service-name* {**bridge group** *bridge-domain-group* **bridge-domain** *bridge-domain-name*| **down-meps**| **xconnect group** *xconnect-group-name* **p2p** *xconnect-name*} [**id** [**icc-based** *icc-string umc-string*] || [**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: • bridge • down-meps • xconnect
bridge	Specifies the use of a bridge domain. Used in conjunction with group and bridge-domain . Note When bridge is specified, all MEPs are up and MIPs are permitted.
group <i>bridge-domain-group</i>	Specifies the name of the bridge domain group.
bridge-domain <i>bridge-domain-name</i>	Specifies the name of the bridge domain and enters the Ethernet CFM domain service mode.
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: • icc-based <i>icc-string umc-string</i>—ITU-based Carrier Code format, with the total ICC and Unique MEG ID Code (UMC) string length no greater than 13 characters. • 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.
Release 4.1.0	This command was modified. The icc-based 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.

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.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to associate a bridge domain service to a domain and enter CFM domain service configuration mode.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain B1
```

```
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)#
```

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Serv_1 down-meps
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)#
```

Related Commands

Command	Description
bridge group (VPLS)	Creates a bridge group to contain bridge domains.
bridge-domain (VPLS)	Establishes a bridge domain and enters L2VPN bridge group bridge domain configuration mode.
domain , on page 189	Creates and names a container for all domain configurations and enter the CFM domain configuration mode.
ethernet cfm (global) , on page 193	Enters Ethernet CFM configuration mode.
p2p	Enters p2p configuration mode to configure point-to-point cross-connects.
show ethernet cfm configuration-errors , on page 300	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 307	Displays all the maintenance points that have been created.
show ethernet cfm local meps , on page 310	Displays information about local MEPs.
show ethernet cfm peer meps , on page 315	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/RSP0/CPU0:router# show efd interfaces
```

```
Server VLAN MA
=====
Interface      Clients
-----
GigE0/0/0/0.0  CFM
```

Related Commands

Command	Description
efd, on page 191	Enables EFD on all down MEPs in a down MEPs service.
log efd, on page 251	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 3.7.2	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 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/RSP0/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 10: 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 3.7.2	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
ethernet-services	read

Examples

The following example shows how to display all the CFM configuration errors on all domains:

```
RP/0/RSP0/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 193	Enters CFM configuration mode.
ethernet cfm (interface), on page 195	Enters interface CFM configuration mode.
traceroute ethernet cfm, on page 389	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/RSP0/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 11: 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 145	Configures AIS transmission for a CFM domain service.
log ais, on page 242	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 147	Configures AIS transmission on a CFM interface.
show ethernet cfm local meps, on page 310	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 3.7.2	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 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/RSP0/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 12: 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 154	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 3.7.2	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
ethernet-services	read

Examples

This example shows how to display maintenance points:

```
RP/0/RSP0/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 13: 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, a 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 310	Displays information about local MEPs.
show ethernet cfm peer meps, on page 315	Displays information about maintenance end points (MEPs) for peer MEPs.
traceroute cache, on page 387	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
traceroute ethernet cfm, on page 389	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 3.7.2	This command was introduced.
Release 3.9.1	New output fields were added for AIS.

Release	Modification
Release 4.3.1	The show ethernet cfm local meps detail and show ethernet cfm local meps verbose command outputs were modified to include CCM interval information.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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

This example shows sample output of the default statistics for local MEPs without any filtering:

```
RP/0/RSP0/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 14: 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/RSP0/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
  
```

This 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/RSP0/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 5), Service bar
Down MEP on GigabitEthernet0/1/0/0.123, MEP-ID 20
=====
Interface state: Up      MAC address: 1122.3344.5566
Peer MEPS: 1 up, 0 with errors, 0 timed out (archived)
Cross-check errors: 0 missing, 0 unexpected
  
```

show ethernet cfm local meps

```

CCM generation enabled:  Yes, 10ms
                        CCM processing offloaded to high-priority software
AIS generation enabled:  No
Sending AIS:             No
Receiving AIS:           No

```

This example shows sample output of detailed statistics for local MEPs:

```
RP/0/RSP0/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 307	Displays a list of local maintenance points.
show ethernet cfm peer meps, on page 315	Displays information about maintenance end points (MEPs) for peer MEPs.
traceroute ethernet cfm, on page 389	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 3.7.2	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
ethernet-services	read

Examples

The following example shows sample output of MEPs detected by a local MEP:

```
RP/0/RSP0/CPU0:router# show ethernet cfm peer meps
```

```
Flags:
> - Ok                      I - Wrong interval
R - Remote Defect received  V - Wrong level
L - Loop (our MAC received) T - Timed out
C - Config (our ID received) M - Missing (cross-check)
X - Cross-connect (wrong MAID) U - Unexpected (cross-check)
* - Multiple errors received
```

```
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 15: 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

This example shows sample detailed output of MEPs detected by a local MEP:

```
RP/0/RSP0/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
```

show ethernet cfm peer meps

```

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
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
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

```

```

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 16: 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 identifier 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 307	Displays a list of local maintenance points.

Command	Description
show ethernet cfm local meps, on page 310	Displays information about local MEPs.
traceroute ethernet cfm, on page 389	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet cfm summary

To display summary information about CFM, use the **show ethernet cfm summary** command in the EXEC mode.

show ethernet cfm summary *location**node-id*

Syntax Description

location <i>node-id</i>	(Optional) Specifies the location for which CFM summary is required. If the location is not specified, an overall summary for all nodes is displayed, followed by information for each node. If the location is specified, only information from that node is displayed.

Command Default

An overall summary for all nodes is displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.3.1	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	Operation
ethernet-services	read

Examples

This example shows how to display ethernet CFM summary:

```
RP/0/RSP0/CPU0:router# show ethernet cfm summary
```

```
CFM System Summary
=====
```

```
Domains                      4
Services                    10000
Local MEPS                  10000
  Operational                9997
    Down MEPS                9997
    Up MEPS                   0
  Offloaded                  200
    3.3ms                     100
```

```

        10ms                                100
        Disabled (misconfiguration)         2
        Disabled (resource limit)           1
        Disabled (operational error)        0
Peer MEPS                                9997
    Operational                            9990
        Defect detected                     5
        No defect detected                  9985
        Timed out                           7
MIPs                                     0
Interfaces                             10000
Bridge domains/Xconnects                10000
Traceroute Cache entries                 3
Traceroute Cache replies                 11
CCM Learning Database entries            10000

```

```

CFM Summary for 0/0/CPU0
=====

```

```

Initial resynchronization: complete

```

```

Domains                                4
Services                             10000
Local MEPS                            1000
    Operational                         999
        Down MEPS                        999
        Up MEPS                          0
        Offloaded                        100
            3.3ms                        100
            10ms                         0
        Disabled (misconfiguration)       1
        Disabled (offload resource limit) 0
        Disabled (operational error)      0
Peer MEPS                              999
    Operational                         998
        Defect detected                   2
        No defect detected                996
        Timed out                        1
MIPs                                   0
Interfaces                             1000
Bridge domains/Xconnects                10000
Traceroute Cache entries                 1
Traceroute Cache replies                 3
CCM Learning Database entries            1000

```

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 3.7.2	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 **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/RSP0/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:
```

show ethernet cfm traceroute-cache

```

Hop  Hostname/Last      Ingress MAC/name      Egress MAC/Name      Relay
-----
 1  abc
    0000-0001.0203.0400  0001.0203.0401 [Ok]      Not present      FDB
 2  bob
    abc                  0001.0203.0402 [Ok]      MPDB
 3  cba
    bob                  0001.0203.0403 [Ok]      Hit
                                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
          0000-0001.0203.0400  Ingress  0015.0000.323f [Ok]      FDB
2        abc
          abc                  Egress   0015.0000.323e [Ok]      FDB
3        0002-0016.eeee.1234  Ingress  0016.eeee.1234 [Ok]      FDB
4        0000-0016.eeee.4321  Egress   0016.eeee.4321 [Ok]      FDB
5        0002-0016.eeee.1234  Ingress  0015.0000.f123 [Ok]      FDB
2        0002-00.16.eeee.4321  Egress   0015.0000.323d [Ok]      FDB
3        abc
          abc                  Ingress  0017.0000.cf01 [Ok]      FDB
4        pe2
          pe2                  Egress   0017.0000.cf01 [Ok]      Drop
4        pe2
          pe2                  Egress   0017.0000.cf01 [Ok]      FDB
5        ce2
          pe2                  Ingress  0015.0000.8830 [Ok]      FDB

```

Replies dropped: 0

Table 17: 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/RSP0/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]                      FDB
      Level: 4, version: 0, Transaction ID: 2
      TTL: 63, Relay Action: RlyFDB
      Forwarded, Terminal MEP not reached
      Last egress ID: 0000-0001.0203.0400
```



```

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 387	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 161	Removes the contents of the traceroute cache.

 show ethernet cfm traceroute-cache

Command	Description
traceroute ethernet cfm, on page 389	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet lmi interfaces

To display Ethernet Local Management Interface (E-LMI) information for an interface, including protocol status and error and event statistics, use the **show ethernet lmi interfaces** command in EXEC configuration mode.

show ethernet lmi interfaces [*type interface-path-id*][**brief** | **detail**]

show ethernet lmi interfaces [**brief** | **detail**][**location** *location*]

Syntax Description

brief	(Optional) Displays summary information about the E-LMI protocol status, number of EVCs and errors, and CE-VLAN/EVC map type.
detail	(Optional) Displays the configured and operational state of E-LMI on the interface, with counts for reliability and protocol errors and elapsed time since various events have occurred, including details about subinterfaces and EVC status.
<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 E-LMI information for the designated node. The <i>location</i> argument is entered in the <i>rack/slot/module</i> notation. Note The location cannot be specified when you specify an interface type.

Command Default

The output displays the configured and operational state of E-LMI on the interface, with counts for reliability and protocol errors and elapsed time since various events have occurred since the protocol was enabled on the interface or counters were cleared.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task 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 Protocol Errors are seen in the output, then the CE device is sending packets to the PE device, but the PE does not understand those packets. This suggests an incorrect implementation of the E-LMI protocol on the CE side, or corruption of the packets on the path between the CE and PE. E-LMI packets have a strictly defined structure in the MEF 16 standard, and any deviation from that results in a protocol error. The PE will not respond to any packets that are malformed and result in a protocol error.

The Reliability Error counters can indicate that messages are being lost between the PE and CE devices. The timers in the last block of the output should indicate that messages are being sent and received by the PE device. Consider the following actions when these Reliability Errors occur:

- Status Enq Timeouts—If this counter is continuously incrementing, it indicates that the Polling Timer on the CE is configured to a greater value than the PVT configuration on the PE. Status Enquiry messages will be sent less frequently than the PVT expects them and PVT timeouts occur. Be sure that the value of the PVT (specified by the **polling-verification-timer** command on the PE) is greater than the Polling Timer value on the CE device.
- Invalid Sequence Number—Indicates that messages from the PE are not being received by the CE. Be sure that the correct interface on the CE device is connected to the corresponding E-LMI interface on the PE device, so that communication can take place. Verify that both interfaces are Up.
- Invalid Report Type—This error can occur under the following conditions:
 - If the protocol is in the process of a status update and an "E-LMI Check" type of STATUS ENQUIRY is received by the PE, then the PE ignores the ENQUIRY and records an error.
 - If the protocol is not in the process of a status update and a "Full Status Continued" type of STATUS ENQUIRY is received by the PE, then the PE ignores the ENQUIRY and records an error.

**Note**

If the protocol is in the process of a status update and a "Full Status" type of STATUS ENQUIRY is received by the PE, then the PE restarts the status update but does not record any error.

Task ID

Task ID	Operation
ethernet-services	read

Examples

The following example shows sample output for the default form of the command:

```
RP/0/RSP0/CPU0:router# show ethernet lmi interfaces
Interface: GigabitEthernet0/0/0/0
  Ether LMI Link Status: Up
  UNI Id: PE1-CustA-Slot1-Port0
  Line Protocol State: Up
  MTU: 1500 (2 PDUs reqd. for full report)
  CE-VLAN/EVC Map Type: Bundling (1 EVC)
  Configuration: Status counter 4, Polling Verification Timer 15 seconds
  Last Data Instance Sent: 1732
  Last Sequence Numbers: Sent 128, Received 128

Reliability Errors:
  Status Enq Timeouts          19 Invalid Sequence Number          0
  Invalid Report Type          0

Protocol Errors:
  Malformed PDUs               0 Invalid Protocol Version          0
  Invalid Message Type          0 Out of Sequence IE              0
  Duplicated IE                 0 Mandatory IE Missing            0
  Invalid Mandatory IE          0 Invalid non-Mandatory IE        0
  Unrecognized IE               0 Unexpected IE                   0

Full Status Enq Rcvd    00:00:10 ago  Full Status Sent    00:00:10 ago
PDU Rcvd                00:00:00 ago  PDU Sent            00:00:00 ago
LMI Link Status Changed 10:00:00 ago  Last Protocol Error  never
Counters cleared        never
```

Table 18: show ethernet lmi interfaces Field Descriptions

Field	Description
Interface:	Name of the interface running the E-LMI protocol.
Ether LMI Link Status:	Status of the E-LMI protocol on the interface. Possible values are Up, Down, or Unknown (PVT disabled).
UNI Id:	Name of the UNI as configured by the ethernet uni id command. This output field does not appear if the UNI ID is not configured.
Line Protocol State:	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
MTU (<i>x</i> PDUs reqd for full report)	Maximum Transmission Unit of the interface and the number (<i>x</i>) of E-LMI PDUs of that size required to send one full status report.
CE-VLAN/EVC Map Type: <i>type</i> (<i>x</i> EVCs)	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible values for <i>type</i> are Bundling, All to One Bundling, or Service Multiplexing with no bundling. The number <i>x</i> of EVCs in the map are displayed in parentheses.
Configuration: Status counter	Value of the MEF N393 Status Counter as configured by the status-counter command.

Field	Description
Polling Verification Timer	Value of the MEF T392 Polling Verification Timer (in seconds) as configured by the polling-verification-timer command. Displays "disabled" if the PVT is turned off.
Last Data Instance Sent:	Current value of the Data Instance.
Last Sequence Numbers: Sent <i>x</i> , Received <i>y</i>	Values of the last sent (<i>x</i>) and received (<i>y</i>) sequence numbers as reported in sent PDUs.
Reliability Errors:	Number of times the specified types of reliability errors have occurred since the protocol was enabled on the interface or counters were cleared: • Status Enq Timeouts—Increments every time the Polling Verification Timer (PVT) expires. • Invalid Report Type—Increments if the Report Type is not appropriate to the protocol's current state. There are four Report Types defined by the E-LMI Standard, and only three of them can appear in Status Enquiry messages that the PE receives. These are: E-LMI Check, Full Status and Full Status Continued. • Invalid Sequence Number—Increments whenever the received sequence number in a Status Enquiry from the CE does not match the last sent sequence number in the PE response. Indicates that messages from the PE are not being received by the CE. The PE continues to respond with the requested Report Type. For more information about possible actions, see the "Usage Guidelines" section.
Protocol Errors: (Malformed PDUs, Invalid Message Type, Duplicated IE, and others)	Number of times the specified types of protocol errors have occurred since the protocol was enabled on the interface or counters were cleared.
Full Status Enq Rcvd, PDU Rcvd, LMI Link Status Changed, Counters cleared, Full Status Sent, PDU Sent, and Last Protocol Error.	Elapsed time (hrs:mins:secs ago) since the specified events last occurred or counters were cleared. Displays "never" if the event has not occurred since the protocol was enabled on the interface or counters were cleared.

The following example shows sample output for the **show ethernet lmi interfaces brief** form of the command:

```
RP/0/RSP0/CPU0:router# show ethernet lmi interfaces brief
Interface          ELMi   LineP   #       CE-VLAN/
                   State  State   EVCs    Errors  EVC Map
-----
Gi0/0/0/0          Up      Up       3       19      Multiplexing, no bundling
Gi0/0/0/1          Down    Admin-down 1       0      All to One Bundling
```

Table 19: show ethernet lmi interfaces brief Field Descriptions

Field	Description
Interface	Name of the interface running the E-LMI protocol.
ELMI State	Status of the E-LMI protocol. Possible values are Up, Down, or N/A if the Polling Verification Timer is disabled.
LineP State	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
# EVCs	Total number of EVCs in the CE-VLAN/EVC map.
Errors	Total number of reliability and protocol errors encountered since the protocol was enabled on the interface or counters were cleared.
CE-VLAN/EVC Map	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible values are Bundling, All to One Bundling, or Multiplexing, no bundling.

The following example shows sample output for the **show ethernet lmi interfaces detail** form of the command:

```
RP/0/RSP0/CPU0:router #show ethernet lmi interfaces detail
Interface: GigabitEthernet0/0/0/0
  Ether LMI Link Status: Up
  UNI Id: PE1-CustA-Slot1-Port0
  Line Protocol State: Up
  MTU: 1500 (2 PDUs reqd. for full report)
  CE-VLAN/EVC Map Type: Bundling (1 EVC)
  Configuration: Status counter 4, Polling Verification Timer 15 seconds
  Last Data Instance Sent: 1732
  Last Sequence Numbers: Sent 128, Received 128

Reliability Errors:
  Status Enq Timeouts          19 Invalid Sequence Number          0
  Invalid Report Type          0

Protocol Errors:
  Malformed PDUs                0 Invalid Protocol Version          0
  Invalid Message Type          0 Out of Sequence IE                0
  Duplicated IE                 0 Mandatory IE Missing              0
  Invalid Mandatory IE          0 Invalid non-Mandatory IE          0
  Unrecognized IE               0 Unexpected IE                     0

Full Status Enq Rcvd    00:00:10 ago  Full Status Sent      00:00:10 ago
PDU Rcvd               00:00:00 ago  PDU Sent              00:00:00 ago
LMI Link Status Changed 10:00:00 ago  Last Protocol Error   never
```

```

Counters cleared          never

Sub-interface: GigabitEthernet0/0/0/0.1
  VLANs: 1,10,20-30, default, untagged/priority tagged
  EVC Status: New, Partially Active
  EVC Type: Multipoint-to-Multipoint
  OAM Protocol: CFM
    CFM Domain: Global (level 5)
    CFM Service: CustomerA
  Remote UNI Count: Configured = 2, Active = 1

Remote UNI Id              Status
-----
PE2-CustA-Slot2-Port2      Up
PE2-CustA-Slot3-Port3      Unreachable

```

Table 20: show ethernet lmi interfaces detail Field Descriptions

Field	Description
Interface:	Name of the interface running the E-LMI protocol.
Ether LMI Link Status:	Status of the E-LMI protocol on the interface. Possible values are Up, Down, or Unknown (PVT disabled).
UNI Id:	Name of the UNI as configured by the ethernet uni id command. This output field does not appear if the UNI ID is not configured.
Line Protocol State:	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
MTU (x PDUs reqd for full report)	Maximum Transmission Unit of the interface and the number (x) of E-LMI PDUs of that size required to send one full status report.
CE-VLAN/EVC Map Type: <i>type</i> (x EVCs)	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible values for <i>type</i> are Bundling, All to One Bundling, or Service Multiplexing with no bundling. The number x of EVCs in the map are displayed in parentheses.
Configuration: Status counter	Value of the MEF N393 Status Counter as configured by the status-counter command.
Polling Verification Timer	Value of the MEF T392 Polling Verification Timer (in seconds) as configured by the polling-verification-timer command. Displays "disabled" if the PVT is turned off.
Last Data Instance Sent:	Current value of the Data Instance.
Last Sequence Numbers: Sent x, Received y	Values of the last sent (x) and received (y) sequence numbers as reported in sent PDUs.

Field	Description
Reliability Errors: (Status Enq Timeouts, Invalid Report Type, and Invalid Sequence Number)	Number of times the specified types of reliability errors have occurred since the protocol was enabled on the interface or counters were cleared.
Protocol Errors: (Malformed PDUs, Invalid Message Type, Duplicated IE, and others)	Number of times the specified types of protocol errors have occurred since the protocol was enabled on the interface or counters were cleared.
Full Status Enq Rcvd, PDU Rcvd, LMI Link Status Changed, Counters cleared, Full Status Sent, PDU Sent, and Last Protocol Error.	Elapsed time (hrs:mins:secs ago) since the specified events last occurred or counters were cleared. Displays "never" if the event has not occurred since the protocol was enabled on the interface or counters were cleared.
Subinterface:	Name of the subinterface corresponding to the EVC.
VLANs:	VLAN traffic on the interface that corresponds to the EFPs encapsulation, with the following possible values: - Numbers of the matching VLAN IDs Note If Q-in-Q encapsulation is configured, only the outer tag is displayed. - default—Indicates that Default tagging is configured, or the encapsulation specifies to match "any." - none—No matches for the configured encapsulation have occurred on the interface. - untagged/priority—Traffic is either untagged or has priority tagging. Note If the message "EVC omitted from Full Status due to encapsulation conflict" is displayed above the VLAN output, a misconfiguration has occurred with two or more EFPs having a conflicting encapsulation.

Field	Description
EVC Status:	State of the EVC, with the following possible values: • Active—E-LMI is operational for this EVC. • Inactive—All of the remote UNIs are unreachable or down. • New—The EVC has not yet been reported to the CE device. • Not yet known—E-LMI is still waiting to receive the status from CFM. This condition should not persist for more than a few seconds. • Partially Active—One or more of the remote UNIs is unreachable or down.
EVC Type:	Type of the EVC, with the following possible values: "Point-to-Point," "Multipoint-to-Multipoint," or "EVC type not yet known."
OAM Protocol:	The OAM protocol from which the EVC status and type are derived. Possible values are either "CFM" or "None."
CFM Domain:	Name of the CFM domain for this EVC.
CFM Service:	Name of the CFM service for this EVC.
Remote UNI Count: Configured = x , Active = y	Number of configured or expected remote UNIs (x) and the number of active remote UNIs (y) within the EVC.
Remote UNI Id:	ID of each remote UNI, including both configured and active remote UNIs where these two sets are not identical. If the number of configured and active remote UNIs is zero, no table is displayed. Note Where no ID is configured for a remote UNI using the ethernet uni id command, then the CFM remote MEP ID is displayed, for example, "<Remote UNI Reference Id: x >"
Status	Status of each remote UNI, with the following possible values: "Up," "Down," "Admin Down," "Unreachable (a configured remote UNI is not active or missing)," or "Unknown (a remote UNI is active but not reporting its status)."

Related Commands

Command	Description
clear ethernet lmi interfaces, on page 163	Clears Ethernet LMI statistics on one or all interfaces.

show ethernet loopback active

To display the loopback sessions that are currently active, use the **show ethernet loopback active** command in the EXEC mode.

show ethernet loopback active {*interface**interface name*| **brief**}

Syntax Description

interface <i>interface name</i>	Displays the active loopback sessions for this specified interface.
brief	Displays a brief information of the active loopback sessions on all interfaces.

Command Default

Displays the information of active loopback sessions on all interfaces.

Command Modes

EXEC(#)

Command History

Release	Modification
Release 5.1	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	Operation
ethernet-services	execute

Examples

This example shows a sample output of the **show ethernet loopback active brief** command:

```
RP/0/RSP0/CPU0:router#show ethernet loopback active brief
```

Interface	ID	Direction	Time left	Status
GigabitEthernet0/0/0/0	1	External	01:23:45	Starting
TenGigE0/1/0/0.200	1	Internal	00:01:17	Active
TenGigE0/1/0/0.200	2	External	00:00:00	Stopping

Each row in the table corresponds to a loopback session which is currently active. For each session, these fields are displayed:

- Interface: The interface on which the loopback session is running.
- ID: The session ID allocated to the session when it was started.
- Direction: The direction of the loopback session.
- Time left: The amount of time left until the loopback session is automatically stopped.
- Status: The status of the loopback session.

show ethernet loopback permitted

To display all the interfaces which are permitted to run loopback sessions, use the **show ethernet loopback permitted** command in the EXEC mode.

show ethernet loopback permitted

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes EXEC(#)

Command History	Release	Modification
	Release 5.1	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	Operation
	ethernet-services	execute

Examples This example shows a sample output of the **show ethernet loopback permitted** command:

```
RP/0/RSP0/CPU0:router#show ethernet loopback permitted
```

```
Interface                               Direction
-----
GigabitEthernet0/0/0/0                 External
GigabitEthernet0/0/0/1.100             Internal
TenGigE0/1/0/0.200                     External, Internal
```

These are the description of the fields in the command output:

- **Interface:** Specifies the interface on which loopback is permitted.
- **Direction:** Specifies the direction in which the loopback is permitted on that interface.

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	

Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/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/RSP0/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
```


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 346	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam statistics, on page 352	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 349	

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/RSP0/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/RSP0/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 343	Displays the current active Ethernet OAM configuration on an interface.

Command	Description
show ethernet oam statistics, on page 352	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 349	

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/RSP0/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 21: 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 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 346	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam statistics, on page 352	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/RSP0/CPU0:router# show ethernet oam statistics interface gigabitethernet 0/1/5/1
```



```

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 343	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 346	Displays the currently configured OAM information of Ethernet OAM sessions on interfaces.
show ethernet oam interfaces, on page 349	

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 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 display information about errors that are preventing configured SLA operations from becoming active:

```
RP/0/RSP0/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 3.9.0	This command was introduced.
Release 4.0.0	The on-demand { all <i>id</i> } and profile all keyword options 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
ethernet-services	read, write

Examples

The following example shows how to display information about configured SLA operations in brief:

```
RP/0/RSP0/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/RSP0/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/RSP0/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/RSP0/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 <i>type</i>	(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. • one-way-loss-ds—Displays only one-way (destination-to-source) loss. • one-way-loss-sd—Displays only one-way (source-to-destination) loss.

Command Default No default behavior or values

Command Modes EXEC (#)

Command History	
Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	• The one-way-delay-ds, one-way-delay-sd, one-way-jitter-ds, and one-way-jitter-sd statistics type keywords were added. • The on-demand all and on-demand id/keyword options and arguments were added. • When the detail keyword is used, the “occurred at” field was added to the display output to show when the last Min/Max statistic happened.
Release 4.3.0	The one-way-loss-ds , one-way-loss-sd statistic type 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.

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/RSP0/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/RSP0/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:
```

show ethernet sla statistics

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

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

| 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

| 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/RSP0/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/RSP0/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

```

**show ethernet sla statistics**

```

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/RSP0/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:
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:
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

```

This example shows how to display the current contents of buckets containing SLM metrics collected by probes on a specific interface:

```

RP/0/RSP0/CPU0:router# show ethernet sla statistics current interface GigabitEthernet 0/0/0/0.0

Interface GigabitEthernet0/0/0/0.0

```

```

Domain mydom Service myser to 00AB.CDEF.1234
=====
Profile 'business-gold', packet type 'cfm-synthetic-loss-measurement'

Scheduled to run every day at 11:50 UTC for 10min (10 bursts)
Frame Loss Ratio calculated every 1min

One-Way Frame Loss (Source->Dest)
~~~~~
1 probes per bucket

Bucket started at 11:50:00 UTC  Fri 01 January 2010 lasting 10min
  Pkts sent: 600; Lost: 62 (10.3%); Corrupt: 0 (0.0%);
    Misordered: 56 (9.3%); Duplicates: 0 (0.0%)
  Min: 1.67%; Max: 21.67%; Mean: 10.05%; StdDev: 2.34%; Overall: 10.03%

Bucket started at 11:50:00 UTC  Sat 02 January 2010 lasting 10min
  Pkts sent: 600; Lost: 23 (3.8%); Corrupt: 0 (0.0%);
    Misordered: 56 (9.3%); Duplicates: 0 (0.0%)
  Min: 1.67%; Max: 11.67%; Mean: 3.08%; StdDev: 1.34%; Overall: 3.03%

```

This example shows how to display statistics for all full buckets for on-demand operations in detail:

```
RP/0/RSP0/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-synthetic-loss-measurement'
Started at 15:38 on 01 July 2008, runs every 1 hour for 1 hour
Frame Loss Ratio calculated every 10min

One-Way Frame Loss (Source->Dest)
~~~~~
1 probes per bucket

Bucket started at 15:38 on Tue 01 Jul 2008, lasting 1 hour:
 Pkts sent: 1200; Lost: 132 (11%); Corrupt: 0 (0%);
 Misordered: 129 (10.8%); Duplicate: 0 (0%)
 Min: 8.00%, occurred at 15:43:29 on Tue 01 Jul 2008 UTC
 Max: 12.12%, occurred at 16:15:34 on Tue 01 Jul 2008 UTC
 Mean: 10.02%; StdDev: 0.98%; Overall: 10.00%

 Bins:
 Range Count Cum. Count Mean

 0 to- 5% 0 (0%) 0 (0%)
 5 to- 10% 2 (33%) 2 (33%) 9.4%
 10 to- 15% 4 (67%) 6 (100%) 10.5%
 > 15% 0 (0%) 6 (100%)

Bucket started at 16:38 on Tue 01 Jul 2008, lasting 1 hour:
 Pkts sent: 1200; Lost: 32 (2.6%); Corrupt: 0 (0%);
 Misordered: 129 (10.8%); Duplicate: 0 (0%)
 Min: 0.60%, occurred at 16:43:29 on Tue 01 Jul 2008 UTC
 Max: 5.12%, occurred at 17:15:34 on Tue 01 Jul 2008 UTC
 Mean: 2.02%; StdDev: 0.58%; Overall: 2.00%

 Bins:
 Range Count Cum. Count Mean

 0 to- 5% 5 (83%) 5 (83%) 1.8%
 5 to- 10% 1 (17%) 6 (100%) 5.12%
 10 to- 15% 0 (0%) 6 (100%)
 > 15% 0 (0%) 6 (100%)

```

 show ethernet sla statistics**Related Commands**

| Command                                   | Description                                                           |
|-------------------------------------------|-----------------------------------------------------------------------|
| <a href="#">buckets size, on page 151</a> | Configures the size of the buckets in which statistics are collected. |

# show ethernet udd interfaces

To display the ethernet interfaces configured with unidirectional link detection protocol, use the **show ethernet udd interfaces** in the ethernet interface configuration mode.

**show ethernet udd interfaces {brief}**

## Syntax Description

|              |                                                          |
|--------------|----------------------------------------------------------|
| <b>brief</b> | Displays a brief summary of the ethernet udd interfaces. |
|--------------|----------------------------------------------------------|

## Command Default

No parameters displays the current state for all udd interfaces.

## Command Modes

Ethernet Interface 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 |
|-------------------|-----------|
| ethernet-services | read      |

## Examples

This example shows a sample output of the **show ethernet udd interfaces** command:

RP/0/RSP0/CPU0:router# **show ethernet udd interfaces**

```

Device ID: 00:0c:cc:cc:01:02
Device name: harpenden2.cisco.com

GigabitEthernet0/1/0/2
 Port state: Up
 Main FSM state: Advertisement
 Detection FSM state: Bidirectional
 Message interval: 60 seconds
 Timeout interval: 5 seconds

Neighbor 1
 Device ID: 00:0a:0b:0c:cc:cc
 Device name: cambridge53.cisco.com
 Port ID: Gi0/12

```

**show ethernet uddl interfaces**

```

Message interval: 7 seconds
Timeout interval: 4 seconds
Echo 1: 00:0c:cc:cc:01:02, Gi0/1/0/2
Echo 2: 00:0a:0b:0c:dd:dd, GE100
Neighbor 2
Device ID: 00:0a:0b:0c:dd:dd
Device name: cambridge54.cisco.com
Port ID: GE100
Message interval: 7 seconds
Timeout interval: 4 seconds
Echo 1: 00:0c:cc:cc:01:02, Gi0/1/0/2
Echo 2: 00:0a:0b:0c:cc:cc, Gi0/12

```

This example shows a sample output of the **show ethernet uddl interfaces** command with the brief keyword:

RP/0/RSP0/CPU0:router# **show ethernet uddl interfaces brief**

| Port        | State          | Neighbor Device       | N'bor port    |
|-------------|----------------|-----------------------|---------------|
| Gi0/1/0/1   | Bidirectional  | london-xr22.cisco.com | Gi3/12/0/24   |
| Gi0/1/0/2   | Bidirectional  | [2 neighbors]         | -             |
| Gi0/1/0/3   | Unknown        | -                     | -             |
| Gi0/1/0/4   | Unidirectional | sj-ios25.cisco.com    | Gi3/5         |
| Te0/12/0/10 | Admin Down     | -                     | -             |
| Te0/12/0/11 | N'bor Mismatch | long-device.cisco.com | LongPortNam>> |

**Table 22: show ethernet uddl interfaces Field Descriptions**

|                |                                                                                                                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Admin Down     | Indicates that the port is administratively down (shutdown configuration is in effect).                                                                                               |
| Error Disabled | Specifies that the port is in Error Disabled state for a non-UDLD reason, or the port has been disabled by UDLD but the daemon has restarted and does not have a record of the cause. |
| Down           | Indicates that the port is operationally down but not Error Disabled.                                                                                                                 |
| Initializing   | Indicates that the port is not yet operating the UDLD protocol.                                                                                                                       |
| Detecting      | Indicates that the port is in the detection phase and is synchronizing the data with its peers.                                                                                       |
| Loopback       | Specifies that the port has been detected to be in loopback.                                                                                                                          |
| Unidirectional | Indicates that the port was unidirectional and was disabled by UDLD.                                                                                                                  |
| N'bor Mismatch | Indicates that the port has been disabled by UDLD due to mismatched neighbors.                                                                                                        |
| No Neighbors   | Specified that the port does not have an active UDLD session with any of the neighbors.                                                                                               |
| Bidirectional  | Indicates that the port is up and has been detected to be bidirectional.                                                                                                              |



|             |                                                                                                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Device ID   | Specifies the ID advertised by the device to its peers. This is a MAC address.                                                                                        |
| Device name | Specifies the string identifier for the device sent to peers. This is a concatenation of the hostname with the configured IP domain (if present), separated by a dot. |

**Related Commands**

| Command                                                    | Description                                                                                          |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <a href="#">show ethernet uddl statistics, on page 370</a> | Displays statistics on state machine transitions and packets sent and received for an UDL interface. |

# show ethernet udd statistics

To display the statistics of state machine transitions and packets exchanged on an interface running UDLD protocol, use the **show ethernet udd statistics** command in the ethernet interface configuration mode.

**show ethernet udd statistics**[*interface type* [**unaccounted-drops** ]

## Syntax Description

|                          |                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface type</b>    | (Optional) Displays information about the specified interface type. If an interface is specified, only the interface-specific counters are shown and not the node counters. |
| <b>unaccounted-drops</b> | (Optional) Displays information for only the node counters.                                                                                                                 |

## Command Default

No default behavior or values

## Command Modes

Ethernet Interface 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 |
|-------------------|-----------|
| ethernet-services | read      |

## Examples

This example shows a sample output of the **show ethernet udd statistics** command:

```
RP/0/RSP0/CPU0:router# show ethernet udd statistics interface GigabitEthernet 0/10/0/11
```

```
Interface GigabitEthernet0/10/0/11
 Counters last cleared: 01:12:11 ago
 Main FSM transitions (to each state)
 Link up: 1
 Detection: 12
 Advertize: 12
 Port shutdown: 0
 UDLD inactive: 0
```

```

Detection FSM transitions (to each state)
 Unknown: 12
 Bidirectional: 12
 Unidirectional: 0
 Neighbor mismatch: 0
 Loopback: 0
Rx packet counts
 Probe: 1
 Echo: 1819
 Flush: 5
 Invalid packets (dropped): 154
Tx packet counts
 Probe: 1
 Echo: 1824
 Flush: 0
 Unable to send (dropped): 0

Node 0/10/CPU0
 Counters last cleared: 01:12:11 ago
 Received on ports without UDLD configured
 Total packet count: 12
 Last port: Gi0/10/0/5
 Rx port could not be determined: 0

```

**Related Commands**

| Command                                                   | Description                                                           |
|-----------------------------------------------------------|-----------------------------------------------------------------------|
| <a href="#">show ethernet udd interfaces, on page 367</a> | Displays a summary of UDLD protocol states for each interface.        |
| <a href="#">show ethernet oam statistics, on page 352</a> | Displays the local and remote Ethernet OAM statistics for interfaces. |

# 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 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 **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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
RP/0/RSP0/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 315</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/RSP0/CPU0:router #configure
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/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**| **one-way-loss-sd**| **one-way-loss-ds**}

**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**| **one-way-loss-sd**| **one-way-loss-ds**}

### 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. |
| <b>one-way-loss-sd</b>   | (CFM loss measurement profile type only) Enables the collection of statistics that measure the synthetic loss in one direction, from source to destination.               |
| <b>one-way-loss-ds</b>   | (CFM loss measurement profile type only) Enables the collection of statistics that measure the synthetic loss in one direction, from destination to source.               |

### Command Default

No statistics are collected

### Command Modes

SLA profile configuration (config-sla-prof)

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.9.0 | This command was introduced. |



| Release       | Modification                                                                                                                                                                                                             |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 4.0.0 | These keyword options were added: <ul style="list-style-type: none"> <li>• <b>one-way-delay-ds</b></li> <li>• <b>one-way-delay-sd</b></li> <li>• <b>one-way-jitter-ds</b></li> <li>• <b>one-way-jitter-sd</b></li> </ul> |
| Release 4.3.0 | These keyword options were added: <ul style="list-style-type: none"> <li>• <b>one-way-loss-sd</b></li> <li>• <b>one-way-loss-ds</b></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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RSP0/CPU0:router(config-sla-prof-stat-cfg)#
```

**Related Commands**

| Command                                    | Description                                                                    |
|--------------------------------------------|--------------------------------------------------------------------------------|
| <a href="#">ethernet sla, on page 202</a>  | Enters the Ethernet SLA configuration mode.                                    |
| <a href="#">profile (SLA), on page 280</a> | Creates an SLA operation profile and enter the SLA profile configuration mode. |

## status-counter

To set the Metro Ethernet Forum (MEF) N393 Status Counter value that is used to determine Ethernet Local Management Interface (E-LMI) operational status, use the **status-counter** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

**status-counter** *threshold*

**no status-counter** *threshold*

### Syntax Description

|                  |                                        |
|------------------|----------------------------------------|
| <i>threshold</i> | Number from 2 to 10. The default is 4. |
|------------------|----------------------------------------|

### Command Default

The N393 Status Counter is set to 4.

### Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.1.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task 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 E-LMI protocol status is currently Up, the Status Counter specifies how many consecutive times the PVT must expire before the status is changed to Down. If the E-LMI status is currently Down, the Status Counter specifies how many STATUS ENQUIRY messages must be received without the PVT expiring before the status is changed to Up. If the PVT is disabled, the status counter has no effect.

### Task ID

| Task ID           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

### Examples

The following example shows how to set the MEF Status Counter for E-LMI to 6:

```
RP/0/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# status-counter 6
```

**Related Commands**

| Command                                                   | Description                                                                                            |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <a href="#">interface (Ethernet), on page 79</a>          | Specifies or creates an Ethernet interface and enters interface configuration mode.                    |
| <a href="#">ethernet lmi, on page 197</a>                 | Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.          |
| <a href="#">show ethernet lmi interfaces, on page 331</a> | Displays E-LMI information for an interface, including protocol status and error and event statistics. |

# 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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# symbol-period window 60000
```

# synthetic loss calculation packets

To configure the number of packets that must be used to calculate each Frame Loss Ratio (FLR) calculation, use the **synthetic loss calculation packets** command in the Ethernet SLA profile probe configuration mode.

**synthetic loss calculation packets** *number*

## Syntax Description

|               |                                                                                                                                                            |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>number</i> | Specifies the number of packets that must be used to calculate each FLR. The range is 10 – 12096000.                                                       |
| <b>Note</b>   | The value must be a divisor of the number of packets per probe. If bursts are configured, the value must be a multiple of the number of packets per burst. |

## Command Default

The default value is the number of packets in the probe, that is each probe results in a single FLR calculation.

## Command Modes

SLA profile probe configuration (config-sla-prof-pb)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.3.0 | 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 **synthetic loss calculation packets** command can only be configured for packet types that support synthetic loss measurement.



### Note

An FLR value is calculated for each discrete block of packets. For instance, if a value of 10 is configured, then the first FLR value is calculated based on packets 0 to 9, the second FLR value is calculated based on packets 10 to 19, and so on.

## Task ID

| Task ID           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example shows how to configure the number of packets to be used to calculate FLR using the **synthetic loss calculation packets** command:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-synthetic-loss-measurement
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# synthetic loss calculation packets 1250
```



# tags

To set the number of outer tags in CFM packets sent from up MEPs in a CFM domain service, use the **tags** command in CFM domain service configuration mode. To return the number of tags in CFM packets to the default value, use the **no** form of this command.

**tags** *number*

**no tags** *number*

## Syntax Description

|               |                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------|
| <i>number</i> | Specifies the number of tags in CFM packets from up MEPs. Currently, the only valid value is 1. |
|---------------|-------------------------------------------------------------------------------------------------|

## Command Default

When not configured, CFM packets are sent with the same number of tags as customer data traffic, according to the encapsulation and rewrite configuration.

## 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 allows you to set the number of tags in CFM packets from up MEPs to 1, so that the system can differentiate between CFM packets and data packets. When not configured, CFM packets from UP MEPs have the same number of tags as data packets, and consequently, may not be forwarded to the appropriate route.

Tags can be configured only for services that are associated with a bridge domain or cross-connect.

## Task ID

| Task ID           | Operations  |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

The following example shows how to set the number of tags in CFM packets from up MEPs in a CFM domain service:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S2 bridge group BG1 bridge-domain BD2
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# tags 1
```

# 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 3.7.2 | 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.

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 tracertop cache.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# tracertop cache hold-time 1 size 3000
```

## Related Commands

| Command                                             | Description                                                |
|-----------------------------------------------------|------------------------------------------------------------|
| <a href="#">ethernet cfm (global), on page 193</a>  | Enters CFM configuration mode.                             |
| <a href="#">tracertop ethernet cfm, on page 389</a> | Sends Ethernet CFM tracertop 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>ttl</b> <i>tll</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 3.7.2 | 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.

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/RSP0/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 387</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 161</a> | Removes the contents of the traceroute cache.                                                                      |
| <a href="#">show ethernet cfm traceroute-cache, on page 324</a>  | Displays the contents of the traceroute cache.                                                                     |

# uni-directional link-fault detection

To enable detection of a local, unidirectional link fault and send notification of that fault to an Ethernet OAM peer, use the **uni-directional link-fault detection** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To remove the configuration from a profile and return to the default, or to remove the override configuration at an interface, use the **no** form of this command.

**uni-directional link-fault detection [disable]**

**no uni-directional link-fault detection [disable]**

## Syntax Description

|                |                                                                                                                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>disable</b> | (Optional, Interface Ethernet OAM configuration only) Overrides the setting of unidirectional link fault detection from an Ethernet OAM profile, and disables it for this interface only. |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

Detection and sending notification of local, unidirectional link faults is disabled.

## 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. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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 affect how the receipt of link-fault messages are handled by the router. Actions to be taken for the receipt of link-fault messages are configured using the **action uni-directional link-fault** command.

Consider the following guidelines when configuring the **uni-directional link-fault detection** command:

- You can configure unidirectional link-fault detection for multiple interfaces that share a similar configuration using the command within an Ethernet OAM profile and attaching the profile to the interfaces to which it applies.
- You can override the profile configuration for unidirectional link-fault detection using the command in interface Ethernet OAM configuration.
- The **disable** keyword is only available in interface Ethernet OAM configuration mode, and it allows you to override the feature set by the profile, and disable it for a particular interface. For example, if unidirectional link-fault detection is enabled within a profile that is attached to an interface, you can



override that configuration to disable it at the interface using the **uni-directional link-fault detection disable** command in interface Ethernet OAM configuration mode.

- You can use the **no** form of the command in either the profile or interface configuration:
  - Running the **no** form of the command within the profile removes the configuration of the uni-directional command in the profile, effectively disabling the feature for all interfaces.
  - Running the **no** form of the command within interface Ethernet OAM configuration removes the override setting of the command at the interface and uses the profile setting.
- The **show ethernet oam configuration** command output will show either Y or N and (Overridden) depending on whether the interface is driving the configuration of the feature, or the profile is driving it. "Overridden" means that the configuration is being applied by the interface.

## Task ID

| Task ID           | Operations  |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

The following example shows how to enable detection of a local, unidirectional link fault and send notification of that fault to an Ethernet OAM peer within an Ethernet OAM profile that can be attached to multiple interfaces:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# uni-directional link-fault detection
```

The same profile can be applied to multiple interfaces. The following example shows how to attach the Ethernet OAM profile to an interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1
RP/0/RSP0/CPU0:router(config-if-eoam)# commit
```

Consider that you have decided that you do not want unidirectional link-fault detection enabled at this particular interface, but you do want to keep the other attached profile settings. The following example shows how to disable link-fault detection at this interface only:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# uni-directional link-fault detection disable
RP/0/RSP0/CPU0:router(config-if-eoam)# commit
```

## Related Commands

| Command                                                         | Description                                                                                                                   |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">action uni-directional link-fault</a> , on page 139 | Configures what action is taken on an interface when a link-fault notification is received from the remote Ethernet OAM peer. |

| Command                                           | Description                                                                                                          |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <a href="#">ethernet oam profile, on page 201</a> | Creates an EOAM profile and enters EOAM configuration mode.                                                          |
| <a href="#">ethernet oam, on page 198</a>         | Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode. |
| <a href="#">profile (EOAM), on page 278</a>       | Attaches an Ethernet OAM profile to an interface.                                                                    |



# Frame Relay Commands on the Cisco ASR 9000 Series Router

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This module provides CLI commands for configuring Frame Relay services on the Cisco ASR 9000 Series Router.

- [clear frame-relay multilink interface, page 397](#)
- [clear frame-relay lmi interface, page 399](#)
- [encap \(PVC\), page 401](#)
- [encapsulation frame-relay, page 403](#)
- [frame-relay intf-type, page 405](#)
- [frame-relay lmi disable, page 407](#)
- [frame-relay lmi-n391dte, page 408](#)
- [frame-relay lmi-n392dce, page 410](#)
- [frame-relay lmi-n392dte, page 412](#)
- [frame-relay lmi-n393dce, page 413](#)
- [frame-relay lmi-n393dte, page 415](#)
- [frame-relay lmi-t391dte, page 416](#)
- [frame-relay lmi-t392dce, page 418](#)
- [frame-relay lmi-type, page 420](#)
- [frame-relay multilink ack, page 422](#)
- [frame-relay multilink bandwidth-class, page 424](#)
- [frame-relay multilink bid, page 426](#)
- [frame-relay multilink hello, page 428](#)
- [frame-relay multilink lid, page 430](#)
- [frame-relay multilink retry, page 432](#)
- [pvc \(frame relay\), page 434](#)

- [show frame-relay lmi](#), page 436
- [show frame-relay lmi-info](#), page 439
- [show frame-relay multilink](#), page 442
- [show frame-relay pvc](#), page 454
- [show frame-relay vcm-info interface](#), page 458
- [show interfaces \(frame relay\)](#), page 460
- [snmp-server traps frame-relay pvc](#), page 465

# clear frame-relay multilink interface

To clear the multilink frame-relay (MFR) statistics for the given interface or location, use the **clear frame-relay multilink interface** command in EXEC mode.

**clear frame-relay multilink interface** {*type interface-path-id*} **all** [**location node 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. |
| <b>all</b>               | Clears MFR statistics for all interfaces                                                                                                                                                                                                                                        |
| <b>location node-id</b>  | (Optional) Clears MFR statistics for all interfaces at the location specified by <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

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 |
|---------|------------|
| fr      | execute    |

**clear frame-relay multilink interface****Examples**

The following example shows how to use the **clear frame-relay multilink interface** command to clear the multilink frame-relay protocol and internal statistics on an interface:

```
RP/0/RSP0/CPU0:router# clear frame-relay multilink interface serial 0/1/0/0
```

**Related Commands**

| Command                                                | Description                                       |
|--------------------------------------------------------|---------------------------------------------------|
| <a href="#">show frame-relay lmi-info, on page 439</a> | Displays Frame Relay information for the LMI.     |
| <a href="#">show interfaces multilink, on page 660</a> | Displays information about a multilink interface. |

# clear frame-relay lmi interface

To clear the LMI statistics for the given interface or location, use the **clear frame-relay lmi** command in EXEC mode.

**clear frame-relay lmi interface** {*type interface-path-id*| **all** [**location node 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. |
| <b>all</b>               | Clears LMI statistics for all interfaces                                                                                                                                                                                                                                        |
| <b>location node-id</b>  | (Optional) Clears LMI statistics for all interfaces at the location specified by <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

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 |
|---------|------------|
| fr      | execute    |

clear frame-relay lmi interface

Examples

The following example shows how to use the **clear frame-relay lmi** command to clear the LMI counters on an interface:

```
RP/0/RSP0/CPU0:router# clear frame-relay lmi interface pos 0/1/0/0
```

Related Commands

| Command                                            | Description                                  |
|----------------------------------------------------|----------------------------------------------|
| <a href="#">show frame-relay lmi</a> , on page 436 | Displays Frame Relay statistics for the LMI. |



## encap (PVC)

To change the encapsulation for a Frame Relay permanent virtual circuit (PVC), use the **encap** command in Frame Relay PVC configuration mode. To restore default encapsulation from the Frame Relay main interface, use the **no** form of this command.

**encap** {**cisco**|**ietf**}

**no encap** {**cisco**|**ietf**}

### Syntax Description

|              |                                                                                                                                                                                                                                               |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>cisco</b> | (Optional) Uses Cisco encapsulation, which is a 4-byte header, with 2 bytes to identify the data-link connection identifier (DLCI) and 2 bytes to identify the packet type.                                                                   |
| <b>ietf</b>  | (Optional) Sets the encapsulation method to comply with the Internet Engineering Task Force (IETF) standard (RFC 1490). Use this keyword when connecting to equipment that belongs to a vendor other than Cisco across a Frame Relay network. |

### Command Default

The default encapsulation keyword is Cisco.

When this command is not configured, encapsulation is inherited from the Frame Relay main interface.

### Command Modes

Frame Relay PVC configuration (config-fr-vc)

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | This command was introduced. |

### Usage Guidelines

Use the **encap** command to configure encapsulation for a Frame Relay PVC. If this command is not configured, encapsulation is inherited from the Frame Relay subinterface.

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples**

The following example shows how to set encapsulation on PVC data-link connection identifier (DLCI) 16 for Packet-over-SONET/SDH (POS) subinterface 0/4/0/1.1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/4/0/1.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# pvc 16
RP/0/RSP0/CPU0:router(config-fr-vc)# encap ietf
```

**Related Commands**

| Command                                                | Description                        |
|--------------------------------------------------------|------------------------------------|
| <a href="#">encapsulation frame-relay, on page 403</a> | Enables Frame Relay encapsulation. |

# encapsulation frame-relay

To enable Frame Relay encapsulation, use the **encapsulation frame-relay** command in interface configuration mode. To disable Frame Relay encapsulation, use the **no** form of this command.

**encapsulation frame-relay [ietf]**

**no encapsulation frame-relay [ietf]**

## Syntax Description

|             |                                                                                                                                                                                                                         |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ietf</b> | (Optional) Sets the encapsulation method to comply with the Internet Engineering Task Force (IETF) standard (RFC 1490). Use this keyword when connecting to equipment from another vendor across a Frame Relay network. |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

The default encapsulation method is Cisco.

## 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.

Use the **encapsulation frame-relay** command to connect an interface to a Frame Relay network. When this command is configured, outgoing packets are encapsulated with a Frame Relay header and Frame Relay headers are removed from incoming packets to the interface.

A Cisco or IETF encapsulation method controls the Network Layer Protocol Identifier (NLPID) that is added to outgoing packets on the interface. The encapsulation method enabled for an outgoing packet can be changed for each data-link connection identifier (DLCI) per subinterface by using the **encap (PVC)** command in Frame Relay PVC configuration mode.

When the **encapsulation frame-relay** command is configured, LMI is enabled by default. To disable LMI use the **frame-relay lmi disable** command.

The following restrictions apply to the **encapsulation frame-relay** command upon configuration or removal of the command on an interface:

- When configuring this command, Layer 3 and Layer 2 configurations are not allowed on the interface.
- Before removing this command, all Frame Relay subinterfaces and LMI configuration should be deleted from the interface.

The **encapsulation frame-relay** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |
| fr        | read, write |

**Examples**

The following example shows Frame Relay encapsulation configured on Packet-over-SONET/SDH (POS) 0/3/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation frame-relay ietf
```

**Related Commands**

| Command                                              | Description                                      |
|------------------------------------------------------|--------------------------------------------------|
| <a href="#">encap (PVC), on page 401</a>             | Changes the encapsulation for a Frame Relay PVC. |
| <a href="#">frame-relay lmi disable, on page 407</a> | Disables the Frame Relay LMI.                    |

# frame-relay intf-type

To configure the interface type of the User-Network Interface (UNI), use the **frame-relay intf-type** command in interface configuration mode. To change the configuration, use the **no** form of this command.

**frame-relay intf-type** {dce| dte| nni}

**no frame-relay intf-type** {dce| dte| nni}

## Syntax Description

|            |                                                     |
|------------|-----------------------------------------------------|
| <b>dce</b> | Router functions as a switch connected to a router. |
| <b>dte</b> | Router is connected to a Frame Relay network.       |
| <b>nni</b> | Router is connected to a NNI signaling interface.   |

## Command Default

DTE

## Command Modes

Interface configuration (config-if)

## Command History

| Release       | Modification                           |
|---------------|----------------------------------------|
| Release 4.0.0 | This command was introduced.           |
| Release 4.2.1 | The <b>nni</b> keyword was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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 **frame-relay intf-type** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

## Examples

The following example shows how to configure a DCE switch type on the interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/4/0/0
```

**frame-relay intf-type**

```
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
```

# frame-relay lmi disable

To disable the Frame Relay Local Management Interface (LMI), use the **frame-relay lmi disable** command in interface configuration mode. To reenable LMI, use the **no** form of this command.

**frame-relay lmi disable**  
**no frame-relay lmi disable**

**Syntax Description** This command has no keywords or arguments.

**Command Default** LMI is enabled.

**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.

The **frame-relay lmi disable** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples** The following example shows how to configure a DCE switch type on the interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/4/0/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi disable
```

## frame-relay lmi-n391dte

To set the full status polling interval, use the **frame-relay lmi-n391dte** command in interface configuration mode. To restore the default interval value, use the **no** form of this command.

**frame-relay lmi-n391dte** *polling-cycles*

**no frame-relay lmi-n391dte** *polling-cycles*

### Syntax Description

|                       |                                                                                                                                                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>polling-cycles</i> | Number of Line Integrity Verification (LIV) exchanges performed before requesting a full status message. Range is from 1 to 255. The default is 6. |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

The full status polling interval is 6.

### 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.

Use the **frame-relay lmi-n391dte** command to set the full status message polling interval. This command is relevant only when the interface type is data terminal equipment (DTE).

Two message types are supported: status inquiry and status. Status inquiry messages are sent from DTE to DCE. Status messages are sent from DCE to DTE (in response to a status inquiry). The Status (Full) and LIV report types are contained within these messages, and typically there is one status transaction for every five LIV transactions.

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |



## Examples

The following example shows that one out of every four status inquiries generated requests a full status response from the DCE on the interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n391dte 4
```

## frame-relay lmi-n392dce

To set the error threshold on a DCE interface, use the **frame-relay lmi-n392dce** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

**frame-relay lmi-n392dce** *threshold*

**no frame-relay lmi-n392dce** *threshold*

### Syntax Description

|                  |                                                             |
|------------------|-------------------------------------------------------------|
| <i>threshold</i> | Error threshold value. Range is from 1 to 10. Default is 3. |
|------------------|-------------------------------------------------------------|

### Command Default

The DCE error threshold 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.

N392 errors must occur within the number defined by the N393 event count for the link to be declared down. Therefore, the threshold value for this command must be less than the count value defined in the **frame-relay lmi-n393dce** command.

The **frame-relay lmi-n392dce** command is relevant only when the interface type is data communication equipment (DCE).

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

### Examples

The following example shows how to set the Local Management Interface (LMI) failure threshold to 4. The router acts as a Frame Relay DCE switch:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
```

```
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n392dce 4
```

**Related Commands**

| Command                                              | Description                          |
|------------------------------------------------------|--------------------------------------|
| <a href="#">frame-relay lmi-n393dce, on page 413</a> | Sets the DCE monitored events count. |

## frame-relay lmi-n392dte

To set the error threshold on a DTE interface, use the **frame-relay lmi-n392dte** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

**frame-relay lmi-n392dte** *threshold*

**no frame-relay lmi-n392dte** *threshold*

### Syntax Description

|                  |                                                                 |
|------------------|-----------------------------------------------------------------|
| <i>threshold</i> | Error threshold value. Range is from 1 to 10. The default is 3. |
|------------------|-----------------------------------------------------------------|

### Command Default

The DTE error threshold 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.

The **frame-relay lmi-n392dte** command is relevant only when the interface type is data terminal equipment (DTE).

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

### Examples

The following example shows how to set the Local Management Interface (LMI) failure threshold to 4. The router acts as a Frame Relay DTE switch.

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n392dte 4
```

# frame-relay lmi-n393dce

To set the DCE monitored events count, use the **frame-relay lmi-n393dce** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

**frame-relay lmi-n393dce** *events*

**no frame-relay lmi-n393dce** *events*

## Syntax Description

|               |                                                                  |
|---------------|------------------------------------------------------------------|
| <i>events</i> | Monitored events count. Range is from 1 to 10. The default is 4. |
|---------------|------------------------------------------------------------------|

## Command Default

The number of DCE monitored events is 4.

## 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.

The **frame-relay lmi-n393dce** command is used along with the **frame-relay lmi-n392dce** command to define the condition that causes the link to be declared down.

N392 errors must occur within the *events* argument count in order for the link to be declared down. Therefore, the events value defined in this command must be greater than the threshold value defined in the **frame-relay lmi-n392 dce** command.

The **frame-relay lmi-n393dce** command is relevant only when the interface type is data communication equipment (DCE).

This **frame-relay lmi-n393dce** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

Examples

The following example shows how to set the Local Management Interface (LMI) monitored events count to 5.

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n393dce 5
```

Related Commands

| Command                                                               | Description                                  |
|-----------------------------------------------------------------------|----------------------------------------------|
| <a href="#">frame-relay lmi-n392dce</a> , <a href="#">on page 410</a> | Sets the error threshold on a DCE interface. |

# frame-relay lmi-n393dte

To set the monitored event count on a DTE interface, use the **frame-relay lmi-n393dte** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

**frame-relay lmi-n393dte** *events*

**no frame-relay lmi-n393dte** *events*

| Syntax Description |                                                                  |
|--------------------|------------------------------------------------------------------|
| <i>events</i>      | Monitored events count. Range is from 1 to 10. The default is 4. |

| Command Default | The number of DTE monitored events is 4. |
|-----------------|------------------------------------------|
|-----------------|------------------------------------------|

| Command Modes | Interface 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. |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The **frame-relay lmi-n393dte** command is relevant only when the interface type is data terminal equipment (DTE).

This **frame-relay lmi-n393dte** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | fr      | read, write |

| Examples | The following example shows how to set the Local Management Interface (LMI) monitored events count to 5. |
|----------|----------------------------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------------------------|

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n393dte 5
```

## frame-relay lmi-t391dte

To set the Local Management Interface (LMI) polling interval, use the **frame-relay lmi-t391dte** command in interface configuration mode. To restore the default interval value, use the **no** form of this command.

**frame-relay lmi-t391dte** *seconds*

**no frame-relay lmi-t391dte** *seconds*

### Syntax Description

|                |                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------|
| <i>seconds</i> | Polling interval between each status inquiry from the DTE end, in seconds. Range is from 5 to 30. The default is 10. |
|----------------|----------------------------------------------------------------------------------------------------------------------|

### Command Default

The LMI polling interval is 10 seconds.

### 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 **frame-relay lmi-t391dte** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

The *seconds* value defined in this command must be less than the polling verification timer defined in the **frame-relay lmi-t392 dce** command.

The **frame-relay lmi-t391dte** command is relevant only when the interface type is data terminal equipment (DCE).

### Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

### Examples

The following example shows how to set the LMI polling timer interval to 15 seconds:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
```



```
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-t391dte 15
```

# frame-relay lmi-t392dce

To set the Local Management Interface (LMI) polling verification timer on the DCE, use the **frame-relay lmi-t392dce** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

```

frame-relay lmi-t392dce seconds
no frame-relay lmi-t392dce seconds

```

|                    |         |                                                                                       |
|--------------------|---------|---------------------------------------------------------------------------------------|
| Syntax Description | seconds | Polling verification timer, in seconds. The range is from 5 to 30. The default is 15. |
|--------------------|---------|---------------------------------------------------------------------------------------|

|                 |                                                   |
|-----------------|---------------------------------------------------|
| Command Default | The LMI polling verification timer is 15 seconds. |
|-----------------|---------------------------------------------------|

|               |                                     |
|---------------|-------------------------------------|
| 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.

The **frame-relay lmi-t392dce** command is used along with the **frame-relay lmi-t391dte** command to define the condition that causes the link to be declared down.

The *seconds* value defined in this command must be greater than the polling verification timer defined in the **frame-relay lmi-t391 dte** command.

This **frame-relay lmi-n392dce** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

|         |         |             |
|---------|---------|-------------|
| Task ID | Task ID | Operations  |
|         | fr      | read, write |

## Examples

The following example shows how to set the Local Management Interface (LMI) polling timer interval to 30 seconds:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-t392dce 30
```

## frame-relay lmi-type

To select the Local Management Interface (LMI) type, use the **frame-relay lmi-type** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

**frame-relay lmi-type** [**ansi**| **cisco**| **q933a**]

**no frame-relay lmi-type** [**ansi**| **cisco**| **q933a**]

### Syntax Description

|              |                                                                  |
|--------------|------------------------------------------------------------------|
| <b>ansi</b>  | (Optional) Uses LMI as defined by ANSI T1.617a-1994 Annex D.     |
| <b>cisco</b> | (Optional) Uses LMI as defined by Cisco (not standard).          |
| <b>q933a</b> | (Optional) Uses LMI as defined by ITU-T Q.933 (02/2003) Annex A. |

### Command Default

The default is **cisco**.

### 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.

If the DTE is not explicitly configured or the **no** form is not used after explicit configuration, then the DTE automatically senses the LMI type of the DCE and use that type of LMI.

This **frame-relay lmi-type** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

### Examples

The following example shows how to set the Local Management Interface (LMI) type to Q.933, Annex A:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
```

```
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-type q933a
```

## frame-relay multilink ack

To configure the MFR acknowledge timeout value for a Frame Relay multilink bundle link, use the **frame-relay multilink ack** command in interface configuration mode. To revert to the default settings, use the **no** form of this command.

**frame-relay multilink ack** *ack-timeout*

**no frame-relay multilink ack**

### Syntax Description

|                    |                                                           |
|--------------------|-----------------------------------------------------------|
| <i>ack-timeout</i> | Ack timeout value, in seconds. The range is from 1 to 10. |
|--------------------|-----------------------------------------------------------|

### Command Default

The default MFR acknowledge timeout value is 4 seconds.

### Command Modes

Interface 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

The **frame-relay multilink ack** command is supported only on serial interfaces. The **frame-relay multilink ack** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink ack** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.



#### Note

You can enter the **frame-relay multilink ack** command at any time without affecting the current state of the interface; however, the configured timeout value does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples**

The following example shows how to configure the MFR acknowledge timeout value as 2 seconds. for the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink ack 2
```

**Related Commands**

| Command                                                | Description                                           |
|--------------------------------------------------------|-------------------------------------------------------|
| <a href="#">encapsulation frame-relay, on page 403</a> | Enables Frame Relay encapsulation.                    |
| <a href="#">frame-relay multilink bid, on page 426</a> | Assigns a BID name to a multilink Frame Relay bundle. |
| <a href="#">show frame-relay lmi-info, on page 439</a> | Displays frame relay information for the LMI.         |
| <b>shutdown (interface)</b>                            | Disables an interface.                                |

# frame-relay multilink bandwidth-class

To configure the bandwidth class for a Frame Relay multilink bundle interface, use the **frame-relay multilink bid bandwidth-class** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

```
frame-relay multilink bandwidth-class {a| b| c threshold}
no frame-relay multilink bandwidth-class
```

|                    |                  |                                                                                                                                                                   |
|--------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <b>a</b>         | Configures bandwidth class A. When one or more member links are up, the bundle interface is up. When all the member links are down, the bundle interface is down. |
|                    | <b>b</b>         | Configures bandwidth class B. When all the member links are up, the bundle interface is up. When any member link is down, the bundle interface is down.           |
|                    | <b>c</b>         | Configures bandwidth class C. The bundle link <i>threshold</i> must be configured.                                                                                |
|                    | <i>threshold</i> | Minimum number of links that must be up for the bundle interface to be up. The range is 1 to 255.                                                                 |

**Command Default** The default is a (Bandwidth Class A).

**Command Modes** Interface configuration

|                 |                |                              |
|-----------------|----------------|------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>          |
|                 | 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.

Bandwidth class is configurable only under Frame Relay Forum 16.1 (FRF 16.1).



**Note** The **frame-relay multilink bandwidth-class** command is supported only on multilink frame relay interfaces. The **frame-relay multilink bandwidth-class** command is not supported on Packet-over-SONET/SDH (POS) or serial interfaces.



**Task ID**

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples**

The following example shows how to set a multilink frame relay interface to bandwidth Class C with a threshold of 3:

```
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/3/1/0/100
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink bandwidth-class c 3
```

**Related Commands**

| Command                                                                 | Description                                   |
|-------------------------------------------------------------------------|-----------------------------------------------|
| <a href="#">show frame-relay lmi-info</a> , <a href="#">on page 439</a> | Displays Frame Relay information for the LMI. |

# frame-relay multilink bid

To create a name for a Frame Relay multilink bundle interface, use the **frame-relay multilink bid** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

**frame-relay multilink bid bundle-id-name**

**no frame-relay multilink bid**

## Syntax Description

*bundle-id-name* Name for the Frame Relay multilink bundle. The bundle identifier (**bid**) name identifies the bundle interface at both endpoints. The **bid** name is exchanged in the information elements to ensure consistent link assignments. The **bid** name can be up to 50 characters including the null termination character. The **bid** name is configured at the bundle interface level and is applied to each member link.

## Command Default

By default, the interface name, for example, Multilink 0/4/1/0/1, is used as the bundle identifier.

## Command Modes

Interface 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

The **frame-relay multilink bid** command is supported only on multilink frame relay interfaces. The **frame-relay multilink bid** command is not supported on Packet-over-SONET/SDH (POS) or serial interfaces.

Regardless of whether you create a bundle identifier name using the **frame-relay multilink bid** command or whether the system uses the default name for the interface, each bundle should have a unique name.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

## Examples

The following example shows how to create a Frame Relay multilink interface bundle identifier name:

```
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/3/1/0/100
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink bid MFRBundle
```

## Related Commands

| Command                                                                 | Description                                   |
|-------------------------------------------------------------------------|-----------------------------------------------|
| <a href="#">show frame-relay lmi-info</a> , <a href="#">on page 439</a> | Displays Frame Relay information for the LMI. |

# frame-relay multilink hello

To configure the hello interval used by a Frame Relay multilink bundle link, use the **frame-relay multilink hello** command in interface configuration mode. To reset the name to the default, use the **no** form of this command.

```
frame-relay multilink hello hello-interval
no frame-relay multilink hello
```

|                    |                       |                                                                                                   |
|--------------------|-----------------------|---------------------------------------------------------------------------------------------------|
| Syntax Description | <i>hello-interval</i> | Hello interval for the Frame Relay multilink bundle link, in seconds. The range is from 1 to 180. |
|--------------------|-----------------------|---------------------------------------------------------------------------------------------------|

|                 |                                           |
|-----------------|-------------------------------------------|
| Command Default | The default hello interval is 10 seconds. |
|-----------------|-------------------------------------------|

|               |                         |
|---------------|-------------------------|
| Command Modes | Interface 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

The **frame-relay multilink hello** command is supported only on serial interfaces. The **frame-relay multilink hello** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink hello** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.



Note

You can enter the **frame-relay multilink hello** command at any time without affecting the current state of the interface; however, the configured hello interval value does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples**

The following example shows how to configure the hello interval value as 10 seconds. for the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink hello 10
```

**Related Commands**

| Command                                                | Description                                           |
|--------------------------------------------------------|-------------------------------------------------------|
| <a href="#">encapsulation frame-relay, on page 403</a> | Enables Frame Relay encapsulation.                    |
| <a href="#">frame-relay multilink bid, on page 426</a> | Assigns a BID name to a multilink Frame Relay bundle. |
| <a href="#">show frame-relay lmi-info, on page 439</a> | Displays frame relay information for the LMI.         |
| shutdown (interface)                                   | Disables an interface.                                |

# frame-relay multilink lid

To create a name for a Frame Relay multilink bundle link, use the **frame-relay multilink lid** command in interface configuration mode. To reset the name to the default, use the **no** form of this command.

**frame-relay multilink lid** *link-id name*

**no frame-relay multilink lid**

|                           |                     |                                                                                                                               |
|---------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>link-id name</i> | Specifies the name for the Frame Relay multilink bundle link. The link identifier (lid) name can be up to 49 characters long. |
|---------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------|

|                        |                                                                                            |
|------------------------|--------------------------------------------------------------------------------------------|
| <b>Command Default</b> | The name of the physical interface, for example, Serial 0/3/0/0/1/2:0, is used as the lid. |
|------------------------|--------------------------------------------------------------------------------------------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | Interface configuration |
|----------------------|-------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 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 **frame-relay multilink lid** command is supported only on serial interfaces. The **frame-relay multilink lid** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink lid** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.



**Note** You can enter the **frame-relay multilink lid** command at any time without affecting the current state of the interface; however, the link identifier name does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.

The lid name is used to identify the bundle link to peer devices and to enable the devices to identify which bundle links are associated with which bundles. The lid name can also be assigned when the bundle link is created using the **encapsulation frame-relay mfr** command with the *name* argument. If a lid name is not assigned, the default lid is the name of the physical interface.

The local and peer lid names do not have to be unique. However, regardless of whether you create a lid name using the **frame-relay multilink lid** command or the system uses the default name for the bundle link, each link within a bundle must have a unique name. If the same name is used by different links in the same bundle, the bundles will flap indefinitely.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples**

The following example shows how to configure the lid name as 'BL1' for the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink lid BL1
```

**Related Commands**

| Command                                                | Description                                           |
|--------------------------------------------------------|-------------------------------------------------------|
| <a href="#">encapsulation frame-relay, on page 403</a> | Enables Frame Relay encapsulation.                    |
| <a href="#">frame-relay multilink bid, on page 426</a> | Assigns a BID name to a multilink Frame Relay bundle. |
| <a href="#">show frame-relay lmi-info, on page 439</a> | Displays frame relay information for the LMI.         |
| shutdown (interface)                                   | Disables an interface.                                |

## frame-relay multilink retry

To configure the retry count for retransmissions for a Frame Relay multilink bundle link, use the **frame-relay multilink retry** command in interface configuration mode. To reset the name to the default, use the **no** form of this command.

**frame-relay multilink retry** *retry-count*

**no frame-relay multilink retry**

### Syntax Description

|                    |                                                            |
|--------------------|------------------------------------------------------------|
| <i>retry-count</i> | Retry count for retransmissions. The range is from 1 to 5. |
|--------------------|------------------------------------------------------------|

### Command Default

The default retry count for retransmissions is 2.

### Command Modes

Interface 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

The **frame-relay multilink retry** command is supported only on serial interfaces. The **frame-relay multilink retry** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink retry** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.



#### Note

You can enter the **frame-relay multilink retry** command at any time without affecting the current state of the interface; however, the configured retry count value does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.



**Task ID**

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples**

The following example shows how to configure the retry count for retransmissions as 2 on the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink retry 2
```

**Related Commands**

| Command                                                | Description                                           |
|--------------------------------------------------------|-------------------------------------------------------|
| <a href="#">encapsulation frame-relay, on page 403</a> | Enables Frame Relay encapsulation.                    |
| <a href="#">frame-relay multilink bid, on page 426</a> | Assigns a BID name to a multilink Frame Relay bundle. |
| <a href="#">show frame-relay lmi-info, on page 439</a> | Displays frame relay information for the LMI.         |
| shutdown (interface)                                   | Disables an interface.                                |

## pvc (frame relay)

To associate a data-link connection identifier (DLCI) number to a permanent virtual circuit (PVC), and to enter Frame Relay PVC configuration mode, use the **pvc** command in subinterface configuration mode. To delete the PVC, use the **no** form of this command.

**pvc** *dlci-number*

**no pvc** *dlci-number*

### Syntax Description

|                    |                                                                     |
|--------------------|---------------------------------------------------------------------|
| <i>dlci-number</i> | DLCI number used to identify the PVC. The range is from 16 to 1007. |
|--------------------|---------------------------------------------------------------------|

### Command Default

No PVC is defined.

### Command Modes

Subinterface configuration (config-subif)

### 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.

Commands available in Frame Relay PVC configuration mode are:

```
RP/0/RSP0/CPU0:router(config-fr-vc)# ?
```

```
commit Commit the configuration changes to running
describe Describe a command without taking real actions
do Run an exec command
encap Set the Encapsulation of this PVC
exit Exit from this submode
no Negate a command or set its defaults
show Show contents of configuration
```

The **pvc** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

## Examples

The following example shows how to create a PVC with DLCI 16:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/4/0/0.1 12transport
RP/0/RSP0/CPU0:router(config-subif)# pvc 16
RP/0/RSP0/CPU0:router(config-fr-vc)#
```

# show frame-relay lmi

To display Frame Relay statistics for the Local Management Interface (LMI), use the **show frame-relay lmi** EXEC command.

**show frame-relay lmi** [**interface** *type interface-path-id*] **location** *node-id*]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface</b>               | (Optional) Interface for which information is to be displayed. Use the <i>interface-path-id</i> argument to specify the interface.                                                                                                                                                         |
| <i>type</i>                    | (Optional) Interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                           |
| <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>location</b> <i>node-id</i> | (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.                                                                                                                                |

## Command Default

Frame Relay LMI statistics are displayed for all interfaces enabled for LMI.

## 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.

The **show frame-relay lmi** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

This command is used to check the status enquiry and status message between DCE and DTE.

**Task ID**

| Task ID | Operations |
|---------|------------|
| fr      | read       |

**Examples**

The following example shows the output from the **show frame-relay lmi** command:

```
RP/0/RSP0/CPU0:router# show frame-relay lmi
```

```
LMI Statistics for interface POS0/1/0/0/ (Frame Relay DCE) LMI TYPE = ANSI
 Invalid Unnumbered Info 0 Invalid Prot Disc 0
 Invalid Dummy Call Ref 0 Invalid Msg Type 0
 Invalid Status Message 0 Invalid Lock Shift 9
 Invalid Information ID 0 Invalid Report IE Len 0
 Invalid Report Request 0 Invalid Keep IE Len 0
 Num Status Enq. Rcvd 9444 Num Status Msgs Sent 9444
 Num Full Status Sent 1578 Num St Enq. Timeouts 41
 Num Link Timeouts 7

LMI Statistics for interface POS0/1/0/1/ (Frame Relay DCE) LMI TYPE = CISCO
 Invalid Unnumbered Info 0 Invalid Prot Disc 0
 Invalid Dummy Call Ref 0 Invalid Msg Type 0
 Invalid Status Message 0 Invalid Lock Shift 0
 Invalid Information ID 0 Invalid Report IE Len 0
 Invalid Report Request 0 Invalid Keep IE Len 0
 Num Status Enq. Rcvd 9481 Num Status Msgs Sent 9481
 Num Full Status Sent 1588 Num St Enq. Timeouts 16
 Num Link Timeouts 4
```

**Table 23: show frame-relay lmi Field Descriptions**

| Field                   | Description                                                                                                                     |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| LMI Statistics          | Signaling or LMI specification: CISCO, ANSI, or CCITT.<br><b>Note</b> CCITT is LMI as defined by ITU-T Q.933 (02/2003) Annex A. |
| Invalid Unnumbered Info | Number of received LMI messages with invalid unnumbered information field.                                                      |
| Invalid Dummy Call      | Number of received LMI messages with invalid dummy calls.                                                                       |
| Invalid Status Message  | Number of received LMI messages with invalid status message.                                                                    |
| Invalid Information ID  | Number of received LMI messages with invalid information identifier.                                                            |
| Invalid Report Request  | Number of received LMI messages with invalid report request.                                                                    |

| Field                 | Description                                                                                  |
|-----------------------|----------------------------------------------------------------------------------------------|
| Num Status Enq. Rcvd  | Number of LMI status enquiry messages received.                                              |
| Num Link Timeouts     | Number of link timeouts.                                                                     |
| Invalid Prot Disc     | Number of received LMI messages with invalid protocol discriminator.                         |
| Invalid Msg Type      | Number of received LMI messages with invalid message type.                                   |
| Invalid Lock Shift    | Number of received LMI messages with invalid lock shift type.                                |
| Invalid Report IE Len | Number of received LMI messages with invalid report IE Length.                               |
| Invalid Keep IE Len   | Number of received LMI messages with invalid report request.                                 |
| Num Status Msgs Sent  | Number of LMI status enquiry messages sent.                                                  |
| Num St Enq. Timeouts  | Number of times the status enquiry message was not received within the T392 DCE timer value. |

# show frame-relay lmi-info

To display Frame Relay information for the Local Management Interface (LMI), use the **show frame-relay lmi-info** command in EXEC mode.

**show frame-relay lmi-info** [**interface** *type interface-path-id*] **location** *node-id*] [**detail**]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface</b>               | (Optional) Displays information on the the interface specified by the <i>type interface-path-id</i> argument.                                                                                                                                                                   |
| <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. |
| <b>location</b> <i>node-id</i> | (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>detail</b>                  | (Optional) Displays managed delci list.                                                                                                                                                                                                                                         |

## Command Default

Displays LMI information for all Frame Relay interfaces enabled for LMI.

## 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.

The **show frame-relay lmi-info** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

This command is used to check the status enquiry and status message between DCE and DTE.

show frame-relay lmi-info

Task ID

| Task ID | Operations |
|---------|------------|
| fr      | read       |

Examples

The following example shows sample output for the **show frame-relay lmi-info** command:

```
RP/0/RSP0/CPU0:router# show frame-relay lmi-info

LMI IDB Info for interface Multilink0/3/0/0/2
 ifhandle: 0x6176840
 Interface type: DTE
 Interface state: UP
 Line Protocol: UP
 LMI type (cnf/oper): AUTO/CISCO
 LMI type autosense: OFF
 Interface MTU: 1504
 ----- DTE -----
 T391: 10s
 N391: (cnf/oper): 6/5
 N392: (cnf/oper): 3/0
 N393: 4
 My seq#: 83
 My seq# seen: 83
 Your seq# seen: 82
 ----- DCE -----
 T392: 15s
 N392: (cnf/oper): 3/0
 N393: 4
 My seq#: 0
 My seq# seen: 0
 Your seq# seen: 0
LMI IDB Info for interface Multilink0/3/0/0/1
 ifhandle: 0x6186240
 Interface type: DTE
 Interface state: UP
 Line Protocol: UP
 LMI type (cnf/oper): AUTO/CISCO
 LMI type autosense: OFF
 Interface MTU: 1504
 ----- DTE -----
 T391: 10s
 N391: (cnf/oper): 6/5
 N392: (cnf/oper): 3/0
 N393: 4
 My seq#: 83
 My seq# seen: 83
 Your seq# seen: 82
 ----- DCE -----
 T392: 15s
 N392: (cnf/oper): 3/0
 N393: 4
 My seq#: 0
 My seq# seen: 0
 Your seq# seen: 0
```

Table 24: show frame-relay lmi-info Field Descriptions

| Field | Description |
|-------|-------------|
| DTE   |             |



| Field | Description                                           |
|-------|-------------------------------------------------------|
| T391  | Local Management Interface polling interval           |
| N391  | Full status polling interval                          |
| N392  | Error threshold value                                 |
| N393  | DTE monitored events count                            |
| DCE   |                                                       |
| T392  | Local Management Interface polling verification timer |
| N392  | Error threshold value                                 |
| N393  | DCE monitored events count                            |

# show frame-relay multilink

To display the multilink Frame-Relay (MFR) information about the given interface along with MFR protocol and internal statistics, use the **show frame-relay multilink interface** command in EXEC mode.

**show frame-relay multilink** [**detail** [**location** *node id*]] **interface** *type interface-path-id* [**detail**| **verbose**]| **location** *node id*| **verbose** [**location** *node id*]]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>detail</b>                  | (Optional) Displays Interface Descriptor Block (IDB) information and Feasible Successor Metrics (FSM) statistics.                                                                                                                                                               |
| <b>location</b> <i>node-id</i> | (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>interface</b>               | (Optional) Interface for which you want to display 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.<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>verbose</b>                 | (Optional) Displays IDB information, FSM statistics and internal statistics.                                                                                                                                                                                                    |

## 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 |
|---------|------------|
| fr      | read       |

**Examples**

The following example shows how to display the multilink Frame-Relay information for all interfaces:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink

Bundle interface: Multilink0/3/0/0/1, ifhandle 0x060322c0
 Member Links: 2 active, 0 inactive
 State = Up, BW Class = A

 Member Links:
 Serial0/3/0/0/1/2:0, HW state = Up, link state = Up
 Serial0/3/0/0/1/1:0, HW state = Up, link state = Up

Bundle interface: Multilink0/3/0/0/2, ifhandle 0x06032280
 Member Links: 2 active, 0 inactive
 State = Up, BW Class = A

 Member Links:
 Serial0/3/0/0/1/4:0, HW state = Up, link state = Up
 Serial0/3/0/0/1/3:0, HW state = Up, link state = Up

Member interface: Serial0/3/0/0/1/1:0, ifhandle 0x060323c0
 HW state = Up, link state = Up
 Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0

Member interface: Serial0/3/0/0/1/2:0, ifhandle 0x06032380
 HW state = Up, link state = Up
 Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0

Member interface: Serial0/3/0/0/1/3:0, ifhandle 0x06032340
 HW state = Up, link state = Up
 Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280

Member interface: Serial0/3/0/0/1/4:0, ifhandle 0x06032300
 HW state = Up, link state = Up
 Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280
```

The following example shows how to display detailed multilink Frame-Relay information for all interfaces, including IDB information and FSM statistics:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink detail

Bundle interface: Multilink0/3/0/0/1, ifhandle 0x060322c0
 Member Links: 2 active, 0 inactive
 State = Up, BW Class = A
 nodeid: 0x838
 group: 1
 my_bid: Multilink0/3/0/0/1
 peer_bid: Multilink0/6/0/0/1
 magic: 0x696d8a95
 flags: 0x0
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 is_owned_resource: Y
 is_zombie: N
```

## show frame-relay multilink

```

active_mbr_count: 2
cfg_bid:
bw_class: 1
bw_class_threshold: 0

```

## ===== Member Links =====

```

Serial0/3/0/0/1/2:0, HW state = Up, link state = Up
my_lid: Serial0/3/0/0/1/2:0
peer_lid: Serial0/6/0/0/1/2:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent up: Yes
Last Packet Tx: 00:00:09 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2

```

```

----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6235 Hello Rx: 6236
Hello Ack Tx: 6236 Hello Ack Rx: 6235
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6236 Ack Timer expiry: 1

```

```

Serial0/3/0/0/1/1:0, HW state = Up, link state = Up
my_lid: Serial0/3/0/0/1/1:0
peer_lid: Serial0/6/0/0/1/1:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent up: Yes
Last Packet Tx: 00:00:01 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2

```

```

----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6234 Hello Rx: 6237
Hello Ack Tx: 6237 Hello Ack Rx: 6234
Loopback Detected: 0 Invalid Pkts Rx: 0

```

```

Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6235 Ack Timer expiry: 1

```

```

Bundle interface: Multilink0/3/0/0/2, ifhandle 0x06032280
Member Links: 2 active, 0 inactive
State = Up, BW Class = A
 nodeid: 0x838
 group: 2
 my_bid: Multilink0/3/0/0/2
 peer_bid: Multilink0/6/0/0/2
 magic: 0x303c008f
 flags: 0x0
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 is_owned_resource: Y
 is_zombie: N
 active_mbr_count: 2
 cfg_bid: 0
 bw_class: 1
 bw_class_threshold: 0

```

```

===== Member Links =====

```

```

Serial0/3/0/0/1/4:0, HW state = Up, link state = Up
 my_lid: Serial0/3/0/0/1/4:0
 peer_lid: Serial0/6/0/0/1/4:0
 flags: 0x0
 fsm_state: 3 [Up]
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 cause: 0 [None]
 retry_count: 0
 in_loopback: No
 bc_init_rcvd: Yes
 bc_owned_res: Yes
 cc_owned_res: Yes
 is_parent_up: Yes
 Last Packet Tx: 00:00:00 ago
 Round trip: 00:00.000 (0 secs 999997 nsecs)
 Min Round trip: 00:00.000 (0 secs 999997 nsecs)
 Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
 cfg_lid: 10
 mfr_t_hello: 4
 mfr_t_ack: 4
 mfr_retry_max: 2

```

```

----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6236 Hello Rx: 6235
Hello Ack Tx: 6235 Hello Ack Rx: 6236
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6237 Ack Timer expiry: 1

```

```

Serial0/3/0/0/1/3:0, HW state = Up, link state = Up
 my_lid: Serial0/3/0/0/1/3:0
 peer_lid: Serial0/6/0/0/1/3:0
 flags: 0x0
 fsm_state: 3 [Up]
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 cause: 0 [None]
 retry_count: 0
 in_loopback: No
 bc_init_rcvd: Yes
 bc_owned_res: Yes
 cc_owned_res: Yes

```

## show frame-relay multilink

```

is_parent_up: Yes
Last Packet Tx: 00:00:01 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6236 Hello Rx: 6237
Hello Ack Tx: 6237 Hello Ack Rx: 6236
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6237 Ack Timer expiry: 1

Member interface: Serial0/3/0/0/1/1:0, ifhandle 0x060323c0
HW state = Up, link state = Up
Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0
Local bid: Multilink0/3/0/0/1 Peer bid: Multilink0/6/0/0/1
my_lid: Serial0/3/0/0/1/1:0
peer_lid: Serial0/6/0/0/1/1:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:00 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6235 Hello Rx: 6237
Hello Ack Tx: 6237 Hello Ack Rx: 6235
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6236 Ack Timer expiry: 1

Member interface: Serial0/3/0/0/1/2:0, ifhandle 0x06032380
HW state = Up, link state = Up
Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0
Local bid: Multilink0/3/0/0/1 Peer bid: Multilink0/6/0/0/1
my_lid: Serial0/3/0/0/1/2:0
peer_lid: Serial0/6/0/0/1/2:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes

```

```

cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:00 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6236 Hello Rx: 6237
Hello Ack Tx: 6237 Hello Ack Rx: 6236
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6237 Ack Timer expiry: 1

Member interface: Serial0/3/0/0/1/3:0, ifhandle 0x06032340
HW state = Up, link state = Up
Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280
Local bid: Multilink0/3/0/0/2 Peer bid: Multilink0/6/0/0/2
my_lid: Serial0/3/0/0/1/3:0
peer_lid: Serial0/6/0/0/1/3:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:02 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6236 Hello Rx: 6237
Hello Ack Tx: 6237 Hello Ack Rx: 6236
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6237 Ack Timer expiry: 1

Member interface: Serial0/3/0/0/1/4:0, ifhandle 0x06032300
HW state = Up, link state = Up
Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280
Local bid: Multilink0/3/0/0/2 Peer bid: Multilink0/6/0/0/2
my_lid: Serial0/3/0/0/1/4:0
peer_lid: Serial0/6/0/0/1/4:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes

```

## show frame-relay multilink

```

bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:01 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 2
Add Link Ack Tx: 2 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 6236 Hello Rx: 6235
Hello Ack Tx: 6235 Hello Ack Rx: 6236
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 6237 Ack Timer expiry: 1

```

The following example shows how to display detailed multilink Frame Relay information for all interfaces, including IDB information and FSM statistics, on a Cisco 2-Port Channelized OC-12c/DS0 SPA:

```

RP/0/RSP0/CPU0:router# show frame-relay multilink detail
Fri Mar 25 14:04:05.425 UTC
Bundle interface: Multilink0/2/1/0/1, ifhandle 0x04002840
 Member Links: 2 active, 0 inactive
 State = Up, BW Class = A
 nodeid: 0x829
 group: 1
 my_bid: Multilink0/2/1/0/1
 peer_bid: Multilink0/2/1/0/1
 magic: 0x75b06726
 flags: 0x0
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 is_owned_resource: Y
 is_zombie: N
 active_mbr_count: 2
 cfg_bid:
 bw_class: 1
 bw_class_threshold: 0

```

===== Member Links =====

```

Serial0/2/1/0/1/2:0, HW state = Up, link state = Up
my_lid: Serial0/2/1/0/1/2:0
peer_lid: Serial0/2/1/0/1/2:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:06 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2

```



```

----- Member Link Statistics -----
Add Link Tx: 2 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 2 Hello Rx: 2
Hello Ack Tx: 2 Hello Ack Rx: 2
Loopback Detected: 0 Invalid Pkts Rx: 1
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 2 Ack Timer expiry: 0

Serial0/2/1/0/1/1:0, HW state = Up, link state = Up
my_lid: Serial0/2/1/0/1/1:0
peer_lid: Serial0/2/1/0/1/1:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:06 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 2 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 2 Hello Rx: 2
Hello Ack Tx: 2 Hello Ack Rx: 2
Loopback Detected: 0 Invalid Pkts Rx: 1
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 2 Ack Timer expiry: 0

Bundle interface: Multilink0/2/1/0/2, ifhandle 0x04002880
Member Links: 2 active, 0 inactive
State = Up, BW Class = A
nodeid: 0x829
group: 2
my_bid: Multilink0/2/1/0/2
peer_bid: Multilink0/2/1/0/2
magic: 0x41f1f15a
flags: 0x0
im_state: 3 [Up]
fsm_req_state: 3 [Up]
is_owned_resource: Y
is_zombie: N
active_mbr_count: 2
cfg_bid:
bw_class: 1
bw_class_threshold: 0

===== Member Links =====

Serial0/2/1/0/1/4:0, HW state = Up, link state = Up
my_lid: Serial0/2/1/0/1/4:0
peer_lid: Serial0/2/1/0/1/4:0
flags: 0x0

```

## show frame-relay multilink

```

fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:06 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 2 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 2 Hello Rx: 2
Hello Ack Tx: 2 Hello Ack Rx: 2
Loopback Detected: 0 Invalid Pkts Rx: 1
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 2 Ack Timer expiry: 0

Serial0/2/1/0/1/3:0, HW state = Up, link state = Up
my_lid: Serial0/2/1/0/1/3:0
peer_lid: Serial0/2/1/0/1/3:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:06 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 2 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 2 Hello Rx: 2
Hello Ack Tx: 2 Hello Ack Rx: 2
Loopback Detected: 0 Invalid Pkts Rx: 1
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 2 Ack Timer expiry: 0

```

The following example shows how to display detailed multilink Frame Relay information for all interfaces, including IDB information and FSM statistics, on a Cisco 4-Port Channelized T3 SPA:

```

RP/0/RSP0/CPU0:router# show frame-relay multilink detail
Member interface: Serial0/0/0/0/1:0, ifhandle 0x00005180
 HW state = Up, link state = Up
 Member of bundle interface Multilink0/0/0/0/1 with ifhandle 0x00005280
 Local bid: Multilink0/0/0/0/1 Peer bid: Multilink0/0/0/0/1
 my_lid: Serial0/0/0/0/1:0

```

```

peer_lid: Serial0/0/0/0/1:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:06 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 21692 Hello Rx: 21690
Hello Ack Tx: 21690 Hello Ack Rx: 21692
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 21693 Ack Timer expiry: 1

Member interface: Serial0/0/0/0/2:0, ifhandle 0x000051c0
HW state = Up, link state = Up
Member of bundle interface Multilink0/0/0/0/1 with ifhandle 0x00005280
Local bid: Multilink0/0/0/0/1 Peer bid: Multilink0/0/0/0/1
my_lid: Serial0/0/0/0/2:0
peer_lid: Serial0/0/0/0/2:0
flags: 0x0
fsm_state: 3 [Up]
im_state: 3 [Up]
fsm_req_state: 3 [Up]
cause: 0 [None]
retry_count: 0
in_loopback: No
bc_init_rcvd: Yes
bc_owned_res: Yes
cc_owned_res: Yes
is_parent_up: Yes
Last Packet Tx: 00:00:03 ago
Round trip: 00:00.000 (0 secs 999997 nsecs)
Min Round trip: 00:00.000 (0 secs 999997 nsecs)
Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
cfg_lid:
mfr_t_hello: 10
mfr_t_ack: 4
mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 21688 Hello Rx: 21694
Hello Ack Tx: 21694 Hello Ack Rx: 21688
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 21689 Ack Timer expiry: 1

```

## show frame-relay multilink

```

Member interface: Serial0/0/0/0/3:0, ifhandle 0x00005200
HW state = Up, link state = Up
Member of bundle interface Multilink0/0/0/0/2 with ifhandle 0x000052c0
Local bid: Multilink0/0/0/0/2 Peer bid: Multilink0/0/0/0/2
 my_lid: Serial0/0/0/0/3:0
 peer_lid: Serial0/0/0/0/3:0
 flags: 0x0
 fsm_state: 3 [Up]
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 cause: 0 [None]
 retry_count: 0
 in_loopback: No
 bc_init_rcvd: Yes
 bc_owned_res: Yes
 cc_owned_res: Yes
 is_parent_up: Yes
 Last Packet Tx: 00:00:03 ago
 Round trip: 00:00.000 (0 secs 999997 nsecs)
 Min Round trip: 00:00.000 (0 secs 999997 nsecs)
 Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
 cfg_lid:
 mfr_t_hello: 10
 mfr_t_ack: 4
 mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 21694 Hello Rx: 21689
Hello Ack Tx: 21689 Hello Ack Rx: 21694
Loopback Detected: 0 Invalid Pkts Rx: 0
Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 21695 Ack Timer expiry: 1

```

```

Member interface: Serial0/0/0/0/4:0, ifhandle 0x00005240
HW state = Up, link state = Up
Member of bundle interface Multilink0/0/0/0/2 with ifhandle 0x000052c0
Local bid: Multilink0/0/0/0/2 Peer bid: Multilink0/0/0/0/2
 my_lid: Serial0/0/0/0/4:0
 peer_lid: Serial0/0/0/0/4:0
 flags: 0x0
 fsm_state: 3 [Up]
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 cause: 0 [None]
 retry_count: 0
 in_loopback: No
 bc_init_rcvd: Yes
 bc_owned_res: Yes
 cc_owned_res: Yes
 is_parent_up: Yes
 Last Packet Tx: 00:00:00 ago
 Round trip: 00:00.000 (0 secs 999997 nsecs)
 Min Round trip: 00:00.000 (0 secs 999997 nsecs)
 Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
 cfg_lid:
 mfr_t_hello: 10
 mfr_t_ack: 4
 mfr_retry_max: 2
----- Member Link Statistics -----
Add Link Tx: 3 Add Link Rx: 1
Add Link Ack Tx: 1 Add Link Ack Rx: 1
Add Link Rej Tx: 0 Add Link Rej Rx: 0
Remove Link Tx: 0 Remove Link Rx: 0
Remove Link Ack Tx: 0 Remove Link Ack Rx: 0
Hello Tx: 21691 Hello Rx: 21689
Hello Ack Tx: 21689 Hello Ack Rx: 21691
Loopback Detected: 0 Invalid Pkts Rx: 0

```

```

Bundle Mismatch: 0 Expired Ack Rx: 0
Hello Timer expiry: 21692 Ack Timer expiry: 1

```

```

Bundle interface: Multilink0/0/0/0/1, ifhandle 0x00005280
Member Links: 2 active, 0 inactive
State = Up, BW Class = A
 nodeid: 0x808
 group: 1
 my_bid: Multilink0/0/0/0/1
 peer_bid: Multilink0/0/0/0/1
 magic: 0x48bac00c
 flags: 0x0
 im_state: 3 [Up]
 fsm_req_state: 3 [Up]
 is_owned_resource: Y
 is_zombie: N
 active_mbr_count: 2
 cfg_bid: 0
 bw_class: 1
 bw_class_threshold: 0

```

The following example shows how to display the multilink Frame-Relay information for the interface at location 0/3/0/0/1:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink interface multilink 0/3/0/0/1
```

```

Bundle interface: Multilink0/3/0/0/1, ifhandle 0x060322c0
Member Links: 2 active, 0 inactive
State = Up, BW Class = A

Member Links:
Serial0/3/0/0/1/2:0, HW state = Up, link state = Up
Serial0/3/0/0/1/1:0, HW state = Up, link state = Up

```

## Related Commands

| Command                                                | Description                                                                         |
|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| <a href="#">interface multilink, on page 650</a>       | Configures a multilink interface and enters multilink interface configuration mode. |
| <a href="#">frame-relay multilink bid, on page 426</a> | Creates a name for a Frame Relay multilink bundle interface.                        |

# show frame-relay pvc

To display statistics about Frame Relay permanent virtual circuits (PVCs), use the **show frame-relay pvc** command in EXEC mode.

**show frame-relay pvc** [**interface** *type interface-path-id*] **location** *node-id*] [*dlci-number*]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface</b>               | (Optional) Interface for which information is to be displayed. Use the <i>type</i> and <i>interface-path-id</i> arguments to specify the interface.                                                                                                                                        |
| <i>type</i>                    | (Optional) Interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                           |
| <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>location</b> <i>node-id</i> | (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.                                                                                                                                |
| <i>dlci-number</i>             | (Optional) DLCI number used to identify the PVC. The range is from 16 to 1007.                                                                                                                                                                                                             |

## Command Default

Information for all Frame Relay interfaces and PVCs is displayed.

## 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.

The **show frame-relay pvc** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

This command is used to check the status of PVCs on interfaces.

## Task ID

| Task ID | Operations |
|---------|------------|
| fr      | read       |

## Examples

The following example shows the output from the **show frame-relay pvc** command:

```
RP/0/RSP0/CPU0:router# show frame-relay pvc
```

```
PVC Statistics for interface POS0/3/2/0 (Frame Relay DCE)
```

|          | Active | Inactive | Deleted | Static |
|----------|--------|----------|---------|--------|
| Local    | 4      | 0        | 0       | 0      |
| Switched | 0      | 0        | 0       | 0      |
| Dynamic  | 0      | 0        | 0       | 0      |

```
DLCI = 612, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.1
input pkts 0 output pkts 0 in bytes 0
out bytes 0 dropped pkts 0 in FECN packets 0
in BECN pkts 0 out FECN pkts 0 out BECN pkts 0
in DE pkts 0 out DE pkts 0
out bcast pkts 0 out bcast bytes 0
pvc create time 00:00:00 last time pvc status changed 00:00:00
```

```
DLCI = 613, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.2
input pkts 0 output pkts 0 in bytes 0
out bytes 0 dropped pkts 0 in FECN packets 0
in BECN pkts 0 out FECN pkts 0 out BECN pkts 0
in DE pkts 0 out DE pkts 0
out bcast pkts 0 out bcast bytes 0
pvc create time 00:00:00 last time pvc status changed 00:00:00
```

```
DLCI = 614, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.3
input pkts 0 output pkts 0 in bytes 0
out bytes 0 dropped pkts 0 in FECN packets 0
in BECN pkts 0 out FECN pkts 0 out BECN pkts 0
in DE pkts 0 out DE pkts 0
out bcast pkts 0 out bcast bytes 0
pvc create time 00:00:00 last time pvc status changed 00:00:00
```

```
DLCI = 615, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.4
input pkts 0 output pkts 0 in bytes 0
out bytes 0 dropped pkts 0 in FECN packets 0
in BECN pkts 0 out FECN pkts 0 out BECN pkts 0
in DE pkts 0 out DE pkts 0
out bcast pkts 0 out bcast bytes 0
pvc create time 00:00:00 last time pvc status changed 00:00:00
```

The following example shows the output for a specific frame-relay PVC:

```
RP/0/RSP0/CPU0:router# show frame-relay pvc 613
```

```
DLCI = 613, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACTI
VE, INTERFACE = POS0/3/2/0.2
input pkts 0 output pkts 0 in bytes 0
out bytes 0 dropped pkts 0 in FECN packets 0
in BECN pkts 0 out FECN pkts 0 out BECN pkts 0
in DE pkts 0 out DE pkts 0
out bcast pkts 0 out bcast bytes 0
```

```
pvc create time 00:00:00 last time pvc status changed 00:00:00
```

**Table 25: show frame-relay pvc Field Descriptions**

| Field           | Description                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| DLCI            | One of the DLCI numbers for the PVC.                                                                                                    |
| DLCI USAGE      | Lists SWITCHED when the router or access server is used as a switch, or LOCAL when the router or access server is used as a DTE device. |
| ENCAP           | Type of encapsulation.                                                                                                                  |
| INHERIT         | Encapsulation type for the PVC is inherited from the main interface.                                                                    |
| PVC STATUS      | Status of the PVC: ACTIVE, INACTIVE, or DELETED.                                                                                        |
| INTERFACE       | Specific subinterface associated with this DLCI.                                                                                        |
| input pkts      | Number of packets received on this PVC.                                                                                                 |
| output pkts     | Number of packets sent on this PVC.                                                                                                     |
| in bytes        | Number of bytes received on this PVC.                                                                                                   |
| out bytes       | Number of bytes sent on this PVC.                                                                                                       |
| dropped pkts    | Number of incoming and outgoing packets dropped by the router at the Frame Relay level.                                                 |
| in FECN pkts    | Number of packets received with the FECN bit set.                                                                                       |
| in BECN pkts    | Number of packets received with the BECN bit set.                                                                                       |
| out FECN pkts   | Number of packets sent with the FECN bit set.                                                                                           |
| out BECN pkts   | Number of packets sent with the BECN bit set.                                                                                           |
| in DE pkts      | Number of DE packets received.                                                                                                          |
| out DE pkts     | Number of DE packets sent.                                                                                                              |
| out bcast pkts  | Number of output broadcast packets.                                                                                                     |
| out bcast bytes | Number of output broadcast bytes.                                                                                                       |
| pvc create time | Time at which the PVC was created.                                                                                                      |



| Field                        | Description                                                                                                                                                                                         |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| last time pvc status changed | Time at which the PVC changed status.                                                                                                                                                               |
| shaping drops                | Number of packets dropped by the traffic-shaping process.                                                                                                                                           |
| Fragment Counters            | Displays whether fragment counters are enabled or disabled on the PVC. Fragment counters are disabled by default. Use the <b>fragment-counter</b> command to enable collection of these statistics. |

# show frame-relay vcm-info interface

To display Virtual Circuit (VC) manager information for a given interface, use the **show frame-relay vcm-info interface** command in EXEC mode.

**show frame-relay vcm-info interface** *type interface-path-id* [**vc dlc***i*]

|                    |                          |                                                                                                                                                                                                                                 |
|--------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                                                        |
|                    |                          | <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>vc</b>                | (Optional) Specifies a VC on the interface.                                                                                                                                                                                     |
|                    | <i>dlci</i>              | (Optional) Data-link Connection Identifier number. Range is from 0 to 1023.                                                                                                                                                     |

**Command Default** No default behavior or values

**Command Modes** EXEC

|                 |                |                              |
|-----------------|----------------|------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>          |
|                 | 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 | <b>Task ID</b> | <b>Operations</b> |
|         | fr             | read              |

## Examples

The following example shows how to display Virtual Circuit (VC) manager information for the multilink interface 0/1/0/0:

```
RP/0/RSP0/CPU0:router# show frame-relay vcm-info interface multilink 0/3/0/0/1

VCM IDB:Multilink0_3_0_0_1
=====
IDB type: IFT_MAIN
<main specific>
 i/f term type: L3
 i/f handle: 0x06186240
 BW: 0x000000c00
 OIR insert: F
VC chkpt oid: 0x00000000
proto info: 500323c8 [ptr]
proto fn table: 500323d4 [ptr]
i/f type: 0x00000037 [IFT_MULTILINK]
i/f state: 0x00000003 [up]
i/f basecaps num: 0x0000004c [fr]
i/f basecaps state: 0x00000003 [up]
VCM states: 5002c708 [ptr]
in db: T
chkpt: F
datapath info 0 [0 bytes]
partner info 50016d98 [16 bytes]
 encaps type: IETF
 intf type: DTE
non chkptd info 0 [0 bytes]
```

## Related Commands

| Command                                                 | Description                                                                         |
|---------------------------------------------------------|-------------------------------------------------------------------------------------|
| <a href="#">interface multilink</a> , on page 650       | Configures a multilink interface and enters multilink interface configuration mode. |
| <a href="#">frame-relay multilink bid</a> , on page 426 | Creates a name for a Frame Relay multilink bundle interface.                        |

# show interfaces (frame relay)

To display statistics about Frame Relay interfaces, use the **show interfaces** command in EXEC mode.

**show interfaces** [**summary**] [*type interface-path-id*] [**brief**|**description**|**detail**|**accounting** [**rates**]] [**location** *node-id*]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>summary</b>                 | (Optional) Displays a summary of interface information by interface type.                                                                                                                                                                                                                  |
| <i>type</i>                    | (Optional) Interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                           |
| <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 brief information about each interface (one line per interface).                                                                                                                                                                                                       |
| <b>description</b>             | (Optional) Displays an interface description.                                                                                                                                                                                                                                              |
| <b>detail</b>                  | (Optional) Displays detailed information about each interface. This is the default.                                                                                                                                                                                                        |
| <b>accounting</b>              | (Optional) Displays the number of packets of each protocol type that have been sent through the interface.                                                                                                                                                                                 |
| <b>rates</b>                   | (Optional) Displays interface accounting rates.                                                                                                                                                                                                                                            |
| <b>location</b> <i>node-id</i> | (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.                                                                                                                                |

## 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.

The **show interfaces** (Frame Relay) command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

**Examples**

The following example shows the output from the **show interfaces** command when the interface is configured with Frame Relay encapsulation:

```
RP/0/RSP0/CPU0:router# show interfaces pos 0/1/0/0

POS0/1/0/0 is up, line protocol is up
 Hardware is Packet over SONET/SDH
 Internet address is Unknown
 MTU 4474 bytes, BW 622080 Kbit
 reliability 255/255, txload 1/255, rxload 1/255
 Encapsulation FRAME-RELAY, crc 32, controller loopback not set,
 LMI enq sent 0, LMI stat recvd 0, LMI upd recvd 0
 LMI enq recvd 9463, LMI stat sent 9463, LMI upd sent 0, DCE LMI up
 LMI DLCI 0 LMI type is ANSI Annex D frame relay DCE
 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
 20934 packets input, 1508069 bytes, 1151 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
 1151 input errors, 1058 CRC, 0 frame, 0 overrun, 93 ignored, 0 abort
 19590 packets output, 990924 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
```

**Table 26: show interfaces Field Descriptions**

| Field           | Description                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------|
| Interface name  | Displays the name of the current interface. In the example, the interface name is POS0/1/0/0.           |
| Interface state | Displays the state of the interface. In the example, the interface is in the administratively up state. |

| Field                                | Description                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                                                                                                                                                                                                                                |
| Internet address is <i>n.n.n.n/n</i> | <p>Displays the Layer 2 address (MAC address for Ethernet interfaces).</p> <p><b>Note</b> Enter the <b>mac-address</b> command to configure the hardware address.</p>                                                                                                                                                                                                                              |
| MTU                                  | <p>Displays the maximum transmission unit (MTU) for the interface. The MTU is the maximum packet size that can be transmitted over the interface.</p> <p><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.</p>                                                                                              |
| BW                                   | Displays the bandwidth of the interface in kbps.                                                                                                                                                                                                                                                                                                                                                   |
| reliability                          | <p>Displays the proportion of packets that are not dropped and do not have errors.</p> <p><b>Note</b> The reliability is shown as a fraction of 255.</p>                                                                                                                                                                                                                                           |
| txload                               | <p>Indicates the traffic flowing out of the interface as a proportion of the bandwidth.</p> <p><b>Note</b> The txload is shown as a fraction of 255.</p>                                                                                                                                                                                                                                           |
| rxload                               | <p>Indicates the traffic flowing into the interface as a proportion of the bandwidth.</p> <p><b>Note</b> The rxload is shown as a fraction of 255.</p>                                                                                                                                                                                                                                             |
| Encapsulation                        | Layer 2 encapsulation installed on the interface.                                                                                                                                                                                                                                                                                                                                                  |
| CRC                                  | <p>Indicates the length of the cyclic redundancy check (CRC), in bytes.</p> <p><b>Note</b> Enter the <b>pos crc</b> command to configure the CRC.</p>                                                                                                                                                                                                                                              |

| Field                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| controller loopback                     | Indicates that the hardware was configured as controller loopback.                                                                                                                                                                                                                                                                                                                                                                                                         |
| LMI enq sent                            | Number of LMI enquiry messages sent.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| LMI stat recvd                          | Number of LMI status messages received.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| LMI upd recvd                           | Number of LMI updated messages received.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| LMI enq recvd                           | Number of LMI enquiry messages received.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| LMI stat sent                           | Number of LMI status messages sent.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| LMI upd sent                            | Number of LMI updated messages sent.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| DCE LMI                                 | Displays the state of the DCE LMI.                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| LMI DLCI                                | Displays the LMI DLCI identifier.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| LMI type                                | Displays the LMI type.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Last clearing                           | Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing for example, load and reliability) are not cleared when the counters are cleared.                                                                                                                                                                             |
| 5 minute input rate5 minute output rate | Average number of bits and packets transmitted per second in the last 5 minutes.<br><br>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 two percent of the instantaneous rate of a uniform stream of traffic over that period. |
| packets input                           | Total number of error-free packets received by the system.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| bytes                                   | Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.                                                                                                                                                                                                                                                                                                                                                             |
| Received...broadcasts                   | Total number of broadcast or multicast packets received by the interface                                                                                                                                                                                                                                                                                                                                                                                                   |

| Field               | Description                                                                                                                                                                                                                                                                                        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| runts               | Number of packets that are discarded because they are smaller than the minimum packet size of the medium.                                                                                                                                                                                          |
| giants              | Number of packets that are discarded because they exceed the maximum packet size of the medium                                                                                                                                                                                                     |
| input errors        | Total number of no buffer, runts, 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 station or far-end device does not match the checksum calculated from the data received. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.                                        |
| frame               | Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.                                                                                                                 |
| overrun             | Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.                                                                                                                      |
| ignored             | Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.                                                                                                  |
| abort               | Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.                                                                                                                                            |
| carrier transitions | Number of times the carrier detect signal of a serial interface has changed state. For example, if data carrier detect (DCD) goes down and comes up, the carrier transition counter will increment two times. Indicates modem or line problems if the carrier detect line is changing state often. |



## snmp-server traps frame-relay pvc

To enable Simple Network Management Protocol (SNMP) trap notifications for a Frame Relay permanent virtual circuit (PVC), use the **snmp-server traps frame-relay pvc** command in global configuration mode. To disable SNMP notifications for a FR PVC, use the **no** form of this command.

**snmp-server traps frame-relay pvc** [*interval seconds*]

**no snmp-server traps frame-relay pvc** [*interval seconds*]

|                           |                                |                                                                                  |
|---------------------------|--------------------------------|----------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>interval</b> <i>seconds</i> | (Optional) Minimum period between successive traps. The range is from 1 to 3600. |
|---------------------------|--------------------------------|----------------------------------------------------------------------------------|

|                        |                     |
|------------------------|---------------------|
| <b>Command Default</b> | <i>seconds</i> : 30 |
|------------------------|---------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | Release 4.0.0  | 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. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Use the **snmp-server traps frame-relay pvc** command to enable trap requests for a Frame Relay PVC. This command is used with the **snmp-server host** command. Use the **snmp-server host** command to specify which host or hosts receive SNMP notifications.

See *Implementing SNMP on Cisco IOS XR Software* in *Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide* for detailed information about SNMP configuration tasks and commands.

|                |                |                   |
|----------------|----------------|-------------------|
| <b>Task ID</b> | <b>Task ID</b> | <b>Operations</b> |
|                | snmp           | read, write       |
|                | fr             | read, write       |

## Examples

The following example shows how to configure the router to send SNMP trap notifications for a Frame Relay PVC:

```
RP/0/RSP0/CPU0:router(config)# snmp-server host 12.26.25.61 traps public udp-port 5000
RP/0/RSP0/CPU0:router(config)# snmp-server community public RW
RP/0/RSP0/CPU0:router(config)# snmp-server traps frame-relay pvc interval 50
```

## Related Commands

| Command                      | Description                                                          |
|------------------------------|----------------------------------------------------------------------|
| <b>snmp-server community</b> | Configures the community access string to permit access to the SNMP. |
| <b>snmp-server host</b>      | Specifies the recipient of an SNMP notification operation.           |



# Global Interface Commands on the Cisco ASR 9000 Series Router

---

This module describes the global command line interface (CLI) commands for configuring interfaces on the Cisco ASR 9000 Series Router.

- [bandwidth \(global\), page 468](#)
- [bundle wait-while, page 470](#)
- [clear interface, page 471](#)
- [dampening, page 473](#)
- [interface \(global\), page 475](#)
- [lACP system , page 477](#)
- [mlACP reset priority, page 478](#)
- [mlACP switchback, page 479](#)
- [mlACP switchover maximize, page 480](#)
- [mlACP switchover type, page 482](#)
- [mtu, page 483](#)
- [show im dampening, page 486](#)
- [show interfaces, page 490](#)
- [show mlACP inconsistencies, page 500](#)
- [shutdown \(global\), page 501](#)

# 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 3.7.2 | 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

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 | This example shows how to configure the bandwidth on a Gigabit Ethernet interface: |
|----------|------------------------------------------------------------------------------------|

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router# interface GigabitEthernet 0/4/1/0
```

```
RP/0/RSP0/CPU0:router# bandwidth 4000000
```

**Related Commands**

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">interface (global), on page 475</a> | Configures an interface or creates or configures a virtual interface.    |
| <a href="#">shutdown (global), on page 501</a>  | Disables an interface (forces an interface to be administratively down). |

# bundle wait-while

To specify the duration of the wait-while timer for a bundle, use the **bundle wait-while** command in the bundle interface configuration mode. To disable waiting, use the **no** form of the command.

**bundle wait-while** *time*

**no bundle wait-while** *time*

## Syntax Description

|             |                                                   |
|-------------|---------------------------------------------------|
| <i>time</i> | Wait-while time in milliseconds, range is 0-2000. |
|-------------|---------------------------------------------------|

## Command Default

2000 milliseconds

## Command Modes

Bundle Interface 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 the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

## Task ID

| Task ID   | Operation   |
|-----------|-------------|
| bundle    | read, write |
| interface | read, write |

## Examples

In the following example, the while-while time is configured for 20 seconds:

```
RP/0/RSP0/CPU0:router(config-if)#bundle wait-while 20
```

# 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 3.7.2 | 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  |
|----------------|-------------|
| interface      | execute     |
| basic-services | read, write |

## Examples

This example shows how to use the **clear interface** command to clear the loopback interface 2:

```
RP/0/RSP0/CPU0:router# clear interface loopback 2
```

clear interface

Related Commands

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">interface (global), on page 475</a> | Configures an interface or creates or configures a virtual interface.    |
| <a href="#">shutdown (global), on page 501</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 3.7.2 | 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.

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**

This example shows how to enable dampening with default values on an interface:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/4/0/0
RP/0/RSP0/CPU0:router(config-if)# dampening
```

**Related Commands**

| Command                                                         | Description                                                                  |
|-----------------------------------------------------------------|------------------------------------------------------------------------------|
| <a href="#">show im dampening</a> , <a href="#">on page 486</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><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 3.7.2 | 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 **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 card in location 0/2/0/1, and interface configuration mode is entered for that interface:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/2/0/1
```

## Related Commands

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">clear interface</a> , on page 471   | Clears interface statistics or packet counters.                          |
| <a href="#">shutdown (global)</a> , on page 501 | Disables an interface (forces an interface to be administratively down). |

# lACP system

To set the default system parameters for the Link Aggregation Control Protocol (LACP) bundles, use the **lACP system** command in global configuration mode.

**lACP system** { **mac**|**priority** }

## Syntax Description

|                 |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| <b>mac</b>      | Unique MAC address used to identify the system in LACP negotiations.                |
| <b>priority</b> | Priority for this system. Lower value is higher priority. Range is from 1 to 65535. |

## Command Default

System priority is 32768. MAC address is automatically assigned from the backplane pool.

## Command Modes

Global 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 the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

The parameters are the system MAC address and the priority of the system. The MAC address must be unique to the system (if it matches a partner system, LACP negotiations fail). The combination of the MAC address and the set system priority determine the priority of the LACP bundles.

## Task ID

| Task ID | Operation   |
|---------|-------------|
| bundle  | read, write |

## Examples

The following example shows how to configure the MAC address on an LACP system:

```
RP/0/RSP0/CPU0:router(config)#lACP system mac 000c.15c0.bd15
```

# mlacp reset priority

To reset operational priorities of mlacp members to their configured mLACP priorities, use the **mlacp reset priority** command in EXEC mode.

**mlacp reset priority** **bundle-ether** *interface-path-id*

|                    |                                              |                                                                          |
|--------------------|----------------------------------------------|--------------------------------------------------------------------------|
| Syntax Description | <b>bundle-ether</b> <i>interface-path-id</i> | Specifies a physical interface instance or a virtual interface instance. |
|--------------------|----------------------------------------------|--------------------------------------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| Command Default | No default behavior or values. |
|-----------------|--------------------------------|

|               |      |
|---------------|------|
| Command Modes | EXEC |
|---------------|------|

| Command History | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>Release 4.0</td><td>This command was introduced.</td></tr></table> | Release | Modification | Release 4.0 | This command was introduced. |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------|---------|--------------|-------------|------------------------------|
| Release         | Modification                                                                                                                    |         |              |             |                              |
| Release 4.0     | 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 the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.</p> <p>This command is for aggregated ethernet interfaces only. The command cannot be used if brute-force switchover is employed.</p> |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Task ID | <table><tr><th>Task ID</th><th>Operation</th></tr><tr><td>bundle</td><td>execute</td></tr></table> | Task ID | Operation | bundle | execute |
|---------|----------------------------------------------------------------------------------------------------|---------|-----------|--------|---------|
| Task ID | Operation                                                                                          |         |           |        |         |
| bundle  | execute                                                                                            |         |           |        |         |

|          |                                                                                                                                                               |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Examples | <p>The following example shows how to use the <b>mlacp reset priority</b> command:</p> <pre>RP/0/RSP0/CPU0:router #mlacp reset priority bundle-ether 10</pre> |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|

# mlacp switchback

To force a switchback to the local mlacp device for a specified bundle, use the **mlacp switchback** command in the bundle interface configuration mode.

**mlacp switchback interface** *interface-path-id* [ **at** | **in** | **no prompt** ]

## Syntax Description

|                                           |                                                                          |
|-------------------------------------------|--------------------------------------------------------------------------|
| <b>interface</b> <i>interface-path-id</i> | Specifies a physical interface instance or a virtual interface instance. |
| <b>at</b>                                 | Schedules the operation for a future time and date.                      |
| <b>in</b>                                 | Schedules the operation for a specified delay.                           |
| <b>no prompt</b>                          | Attempts to carry out the command without prompting.                     |

## Command Default

No default behavior or values.

## Command Modes

EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| Release 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 the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

## Task ID

| Task ID   | Operation   |
|-----------|-------------|
| bundle    | read, write |
| interface | read, write |

## Examples

The following example shows how to schedule the operation at a specified time and date on a bundle-ether interface:

```
RP/0/RSP0/CPU0:router#mlacp switchback bundle-ether 20 at march 21 08:30:10
```

# mlacp switchover maximize

To set the maximum number of links or bandwidth in the bundle, use the **mlacp switchover maximize** command in the bundle interface configuration mode.

**mlacp switchover maximize { links | bandwidth } [threshold value]**

## Syntax Description

|                  |                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>links</b>     | Compares the operational links, with respect to the total number of links.                                                                                                                                                                                                                                                                                                                            |
| <b>bandwidth</b> | Compares the available bandwidth, with respect to the total bandwidth.                                                                                                                                                                                                                                                                                                                                |
| <b>threshold</b> | Sets the threshold value to switch to the peer, if its has more links/ bandwidth available.                                                                                                                                                                                                                                                                                                           |
| <i>value</i>     | <ul style="list-style-type: none"> <li>When used with the links keyword, sets the minimum number of links, below which the device switches to the peer if more links are available. Range is 1-64.</li> <li>When used with the bandwidth keyword, sets the minimum bandwidth (in kbps), below which the device switches to the peer if more bandwidth is available. Range is 1-4294967295.</li> </ul> |

## Command Default

No default behavior or value.

## Command Modes

Bundle interface 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 the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

This command allows switchovers to take place such that the active device is the one with most bandwidth or maximum links in the bundle.

## Task ID

| Task ID   | Operation  |
|-----------|------------|
| bundle    | read,write |
| interface | read,write |



## Examples

The following example shows how to maximize the links:

```
RP/0/RSP0/CPU0:router(config-if)#interface bundle-ether 10 mlacp switchover maximize links
threshold 20
```

# mlacp switchover type

To specify a non-default switchover method , use the **mlacp switchover type**command in the bundle interface configuration mode.

**mlacp switchover type** [ **brute-force** | **revertive** ]

|                    |                    |                                                       |
|--------------------|--------------------|-------------------------------------------------------|
| Syntax Description | <b>brute-force</b> | Force switchover by disabling all local member links. |
|                    | <b>revertive</b>   | Revert based on configured priority values.           |

**Command Default** The default switchover type is non-revertive.

**Command Modes** Bundle interface configuration.

|                 |                |                              |
|-----------------|----------------|------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>          |
|                 | 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 the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

The **brute-force** and **revertive** options are mutually exclusive, and the value must match on the bundle on both POAs. They determine whether the dynamic priority management or brute force mechanism is used, and whether the behavior is revertive or non-revertive.

|         |                |                  |
|---------|----------------|------------------|
| Task ID | <b>Task ID</b> | <b>Operation</b> |
|         | interface      | read, write      |

**Examples**

The following example shows how to force a switchover by disabling all local member links on an bundle-ether interface:

```
RP/0/RSP0/CPU0:router (config-if) #mlacp switchover type brute-force
```

# 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 3.7.2 | 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 **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

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**

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/RSP0/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/RSP0/CPU0/0 | up            | up             | ARPA          | 1514          | 100000       |

```
RP/0/RSP0/CPU0:router# configure
```

```
RP/0/RSP0/CPU0:router(config)# interface POS 6/0/0/0
```

```
RP/0/RSP0/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/RSP0/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          | 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/RSP0/CPU0/0 | up            | up             | ARPA          | 1514          | 100000       |

## Related Commands

| Command                                        | Description                                                              |
|------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">shutdown (global), on page 501</a> | 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 3.7.2 | 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 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/RSP0/CPU0:router(config)# interface POS 0/4/0/3
RP/0/RSP0/CPU0:router(config-if)# no shutdown
RP/0/RSP0/CPU0:router(config-if)# dampening
RP/0/RSP0/CPU0:router# show im dampening
```

| Interface  | Proto | Caps | Penalty Suppressed |
|------------|-------|------|--------------------|
| -----      | ----- | ---- | -----              |
| POS0/4/0/3 | 0     | 0    | 0 NO               |

```
RP/0/RSP0/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
 restart-penalty: 0
```

```
RP/0/RSP0/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
 restart-penalty: 0
 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
```

This 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 encapsulations which have their own penalty as shown below:

```
RP/0/RSP0/CPU0:router# show im dampening
```

| Interface              | Protocol | Capsulation | Pen  | Sup  |
|------------------------|----------|-------------|------|------|
| -----                  | -----    | -----       | ---- | ---- |
| GigabitEthernet0/0/0/0 |          |             | 629  | NO   |

**show im dampening**

```
GigabitEthernet0/0/0/1 2389 YES
POS0/2/0/0 0 NO
POS0/2/0/0 0 NO
POS0/2/0/0 <base> ppp 0 NO
 ipv4 ipcp 0 NO
```

RP/0/RSP0/CPU0:router# **show im dampening interface TenGigaE 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
 restart-penalty: 0
```

| 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 encapsulations 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 encapsulation as well as the interface itself as shown for the POS interface in the previous example.

**Table 27: 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.                                                                                                                                             |
| restart-penalty   | Penalty assigned to the interface when it flaps.                                                                                                                                                                                     |



**Related Commands**

| Command                                         | Description                                                              |
|-------------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">dampening</a> , on page 473         | Turns on event dampening.                                                |
| <a href="#">shutdown (global)</a> , on page 501 | 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** | **description** | **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. 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</b> <i>node-id</i> | (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 of each interface (one line per interface).                                                                                                                                                                                            |

|                    |                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------|
| <b>description</b> | (Optional) Displays the status, protocol, and description of 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**

| <b>Release</b> | <b>Modification</b>                                                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.7.2  | This command was introduced.                                                                                                                            |
| Release 3.9.0  | 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 4.2.0  | Support for Bundle-POS and CEM interfaces was included.                                                                                                 |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task 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** 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 3.9.0, when you shut down a bundle interface, the member links are put into err-disable link interface status and admin-down line protocol state.

Beginning in Cisco IOS XR Release 4.2.0, the Bundle-POS interface type is supported.

**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/RSP0/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
```

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/RSP0/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/RSP0/CPU0/0 | up          | up         | ARPA        | 1514 | 100000   |
| Mg0/RSP0/CPU0/1 | admin-down  | admin-down | ARPA        | 1514 | 100000   |
| 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 28: show interfaces Field Descriptions**

| Field                       | Description                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface name              | Displays the name of the current interface. In the example, the interface name is TenGigE0/1/0/1.                                                                                                                                                                                                                                                                                           |
| Interface state             | Displays the state of the interface. In the example, the interface is in the administratively down state.                                                                                                                                                                                                                                                                                   |
| line protocol state         | 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.<br><br><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). |
| Hardware                    | Displays the current hardware type.                                                                                                                                                                                                                                                                                                                                                         |
| 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.                                                                                              |

| Field                           | Description                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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><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><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><b>Note</b> The rxload is shown as a fraction of 255.                                                                                                                       |
| Encapsulation                   | Layer 2 encapsulation installed on the interface.                                                                                                                                                                                                                 |
| CRC                             | Indicates the length of the cyclic redundancy check (CRC), in bytes.<br><b>Note</b> The CRC is not present for all interface types.<br><b>Note</b> Enter the <b>pos crc</b> command to configure the CRC.                                                         |
| loopback or controller loopback | Indicates whether the hardware has been configured to be looped back.<br><b>Note</b> Enter the <b>loopback</b> command to configure the loopback or controller loopback.                                                                                          |
| keepalive                       | Displays the configured keepalive value, in seconds.<br><b>Note</b> Enter the <b>keepalive</b> command to configure the value of the keepalive field.<br><b>Note</b> The <i>keepalive</i> field may not be present if it is not applicable to the interface type. |
| Duplexity                       | Displays the duplexity of the link.<br><b>Note</b> This field is present only for shared media.<br><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.                      |
| 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.                                                                                                                                                                                                                                      |

| Field                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 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 will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.</p> |



| Field                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 will be 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. This does not include drops due to unknown Layer 3 protocol.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Field                      | Description                                                                                                                                                                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                          |
| bytes output               | Total number of bytes successfully received on the interface.                                                                                                                                                                                           |
| total output drops         | Number of packets that were dropped before being transmitted                                                                                                                                                                                            |
| 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.                                                                                                                               |

| Field                      | Description                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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. |

# show mlacp inconsistencies

To check and highlight inconsistencies and misconfigurations in mlacp setup, use the **show mlacp inconsistencies** command in EXEC mode.

**show mlacp inconsistencies**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values.

**Command Modes** EXEC

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | Release 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 the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

| Task ID | Task ID | Operation |
|---------|---------|-----------|
|         | bundle  | read      |

**Examples** The followig example shows how to view mlacp inconsistencies:

```
RP/0/RSP0/CPU0:router # show mlacp inconsistencies
```

# 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 3.7.2 | 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 **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/RSP0/CPU0:router(config)# interface POS 0/4/0/2
RP/0/RSP0/CPU0:router(config-if)# shutdown
```

Related Commands

| Command                                       | Description                                                                            |
|-----------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">show interfaces</a> , on page 490 | Displays statistics for all interfaces configured on the router or on a specific node. |
| show ip interface                             | Displays IPv4 interface status and configuration.                                      |



# Internal Ethernet Control Network Commands on the Cisco ASR 9000 Series Router

---

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

- [clear controller backplane ethernet location statistics, page 504](#)
- [show controllers backplane ethernet local brief, page 505](#)
- [show controllers backplane ethernet local clients, page 507](#)
- [show controllers backplane ethernet local detail, page 509](#)
- [show controllers backplane ethernet local multicast groups, page 511](#)
- [show controllers backplane ethernet location brief, page 513](#)
- [show controllers backplane ethernet location clients, page 516](#)
- [show controllers backplane ethernet location detail, page 518](#)
- [show controllers backplane ethernet location multicast groups, page 521](#)
- [show controllers switch ports, page 523](#)
- [show controllers switch stats, page 525](#)

# clear controller backplane ethernet location statistics

To delete the aggregate statistics of traffic sent and received over the control Ethernet, use the **clear controller backplane ethernet location statistics** command in EXEC mode.

**clear controller backplane ethernet location** *node-id* **statistics**

## Syntax Description

|                |                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>node-id</i> | Identifies the node whose controller information you want to delete. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation. |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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 clear all client statistics on the node at 0/1/1:

```
RP/0/RSP0/CPU0:router# clear controller backplane ethernet location 0/1/1 clients all statistics
```



# show controllers backplane ethernet local brief

To display brief information about the Ethernet interface that connects the node to the router control Ethernet, use the **show controllers backplane ethernet local brief** command in EXEC mode.

**show controllers backplane ethernet local brief**

## Syntax Description

This command has no keywords or arguments.

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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 the output from the **show controllers backplane ethernet local brief** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local brief

FastEthernet0_RP1_0 (local) is up, MTU 1514 bytes
 561688 packets input, 53760372 bytes
 683424 packets output, 216565877 bytes
RP/0/RSP0/CPU0:router#
```

**Table 29: show controllers backplane ethernet local 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.                                   |

## Related Commands

| Command                                                                         | Description |
|---------------------------------------------------------------------------------|-------------|
| <a href="#">show controllers backplane ethernet local clients</a> , on page 507 |             |

| Command                                                                                  | Description                                                                               |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet local detail</a> , on page 509           |                                                                                           |
| <a href="#">show controllers backplane ethernet local multicast groups</a> , on page 511 | Displays all multicast addresses currently being used by active interfaces on the router. |

# show controllers backplane ethernet local clients

To display information about local client applications, use the **show controllers backplane ethernet local clients** command in EXEC mode.

**show controllers backplane ethernet local clients** [*client-id statistics*] *all*

## Syntax Description

|                             |                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------|
| <i>client-id statistics</i> | Displays a list of client statistics for the specified client ID. Range is from 1 to 22. |
| <b>all</b>                  | Displays a list of all client applications and their IDs.                                |

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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 the output from the **show controllers backplane ethernet local clients** command, which displays a list of client statistics for client ID 1:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local clients 1 statistics

Client QNET, ES Client Id 1, PID 20498 running on FastEthernet0_33_1
490915 packets input, 41918238 bytes
490912 packets delivered, 41918120 bytes
0 packets discarded (0 bytes) in garbage collection
0 (0 bytes) unicast packets filtered
0 (0 bytes) multicast packets filtered
0 (0 bytes) buffer mgmt policy discards
555660 packets output, 134265364 bytes, 0 could not be transmitted
```

**Table 30: show controllers backplane ethernet local clients Field Descriptions**

| Field  | Description                                                                          |
|--------|--------------------------------------------------------------------------------------|
| Client | Client application name and ID, followed by backplane client application statistics. |

 show controllers backplane ethernet local clients

| Field | Description |
|-------|-------------|
| PID   | Process ID. |

**Related Commands**

| Command                                                                                  | Description                                                                                                    |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet local brief</a> , on page 505            | Displays brief information about the Ethernet interface that connects the node to the router control Ethernet. |
| <a href="#">show controllers backplane ethernet local detail</a> , on page 509           |                                                                                                                |
| <a href="#">show controllers backplane ethernet local multicast groups</a> , on page 511 | Displays all multicast addresses currently being used by active interfaces on the router.                      |

# show controllers backplane ethernet local detail

To display detailed information for the Ethernet interface that connects the node to the router control Ethernet, use the **show controllers backplane ethernet local detail** command in EXEC mode.

**show controllers backplane ethernet local detail**

**Syntax Description** This command has no keywords or arguments.

**Command Modes** EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.7.2 | 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 the output from the **show controllers backplane ethernet local detail** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local detail

FastEthernet0_33_1 is up
 Hardware is 10/100 Ethernet, H/W address is 5246.4800.0211
 Internet address is 10.0.2.17
 MTU 1514 bytes
 Encapsulation HFRIES (HFR Internal Ethernet Server)
 Mode : Full Duplex, Rate : 100Mb/s
 787486 packets input, 64535218 bytes, 0 total input drops
 0 packets discarded (0 bytes) in garbage collection
 3 packets discarded (582 bytes) in recv processing
 Received 8 broadcast packets, 285994 multicast packets
 Input errors: 0 CRC, 0 overrun, 0 alignment, 0 length, 0 collision
 682244 packets output, 157245225 bytes, 0 total output drops
 Output 42649 broadcast packets, 42649 multicast packets
 Output errors: 0 underruns, 0 aborts, 0 loss of carrier
```

**Table 31: show controllers backplane ethernet local detail Field Descriptions**

| Field            | Description                                                   |
|------------------|---------------------------------------------------------------|
| Hardware         | Provides the hardware type, followed by the hardware address. |
| Internet address | IP address of the interface.                                  |

**show controllers backplane ethernet local detail**

| Field         | Description                                                                   |
|---------------|-------------------------------------------------------------------------------|
| MTU           | Maximum packet size, in bytes, that a particular interface can handle.        |
| Encapsulation | Encapsulation method assigned to the interface.                               |
| Mode          | Indicates the operating mode of the interface, followed by transmission data. |

**Related Commands**

| Command                                                                                  | Description                                                                                                    |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet local brief</a> , on page 505            | Displays brief information about the Ethernet interface that connects the node to the router control Ethernet. |
| <a href="#">show controllers backplane ethernet local clients</a> , on page 507          |                                                                                                                |
| <a href="#">show controllers backplane ethernet local multicast groups</a> , on page 511 | Displays all multicast addresses currently being used by active interfaces on the router.                      |

# show controllers backplane ethernet local multicast groups

To display all multicast addresses currently being used by active interfaces on the router, use the **show controllers backplane ethernet local multicast groups** command in EXEC mode.

**show controllers backplane ethernet local multicast groups**

**Syntax Description** This command has no keywords or arguments.

**Command Modes** EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.7.2 | 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 the output from the **show controllers backplane ethernet local multicast groups** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local multicast groups
```

| Intf<br>Name           | Multicast<br>address | Client<br>Id | registered for this address<br>Name |
|------------------------|----------------------|--------------|-------------------------------------|
| FastEthernet0_RP1_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                                 |
|                        | 0100.0000.0070       | 2            | GSP                                 |
|                        | 0100.0000.0072       | 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                                 |
|                        | 0100.0000.277c       | 2            | GSP                                 |
|                        | 0100.0000.277e       | 2            | GSP                                 |
|                        | 0100.0000.2780       | 2            | GSP                                 |
|                        | 0100.0000.2782       | 2            | GSP                                 |
|                        | 0100.0000.2784       | 2            | GSP                                 |
|                        | 0100.0000.2786       | 2            | GSP                                 |

--More--

**Table 32: show controllers backplane ethernet local multicast groups Field Descriptions**

| 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 local brief, on page 505</a>   | Displays brief information about the Ethernet interface that connects the node to the router control Ethernet. |
| <a href="#">show controllers backplane ethernet local clients, on page 507</a> |                                                                                                                |
| <a href="#">show controllers backplane ethernet local detail, on page 509</a>  |                                                                                                                |



# show controllers backplane ethernet location brief

To display brief information about backplane Ethernet interfaces in a particular location, use the **show controllers backplane ethernet location brief** command in EXEC mode.

**show controllers backplane ethernet location *node-id* brief**

**Syntax Description** This command has no keywords or arguments.

**Command Modes** EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.7.2 | 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 the output from the **show controllers backplane ethernet location brief** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet location 0/1/0 brief

FastEthernet0_0_CPU0 (local) is up, MTU 1514 bytes
 57569 packets input, 5999749 bytes
 36963 packets output, 4105673 bytes
RP/0/RSP0/CPU0:router#
```

**Table 33: show controllers backplane ethernet location 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.                                   |

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input errors       | <p>Displays the 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 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             | Indicates the total number of broadcast and multicast packets transmitted by the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Output errors      | <p>Displays the 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>                                                                                                                                                                                                                                    |

**Related Commands**

| Command                                                                                            | Description                                                                            |
|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet location clients</a> , <a href="#">on page 516</a> | Displays information about client applications in a particular location.               |
| <a href="#">show controllers backplane ethernet location detail</a> , <a href="#">on page 518</a>  | Displays detailed information about the backplane interfaces in a particular location. |

# show controllers backplane ethernet location clients

To display information about client applications in a particular location, use the **show controllers backplane ethernet location clients** command in EXEC mode.

**show controllers backplane ethernet location *node-id* clients *client-id* {statistics| all}**

## Syntax Description

|                                    |                                                                                                                                                                                                                                                               |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>node-id</i>                     | Identifies the node whose local client applications information you want to display. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.<br><br><b>Note</b> Enter the <b>show platform</b> command to obtain the <i>node-id</i> . |
| <i>client-id</i> <b>statistics</b> | Displays a list of client statistics for the specified client ID. Range is from 1 through 22.                                                                                                                                                                 |
| <i>client-id</i> <b>all</b>        | Displays a list of all client applications and their IDs.                                                                                                                                                                                                     |

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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 the output from the **show controllers backplane ethernet location clients** command, which displays detailed information about the backplane client application statistics:

```
RP/0/RSP1/CPU0:router# show controllers backplane ethernet location 0/0/CPU0 clients all
```

| 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 34: show controllers backplane ethernet location clients Field Descriptions**

| 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 location brief</a> ,<br><a href="#">on page 513</a>  | display brief information about backplane Ethernet interfaces in a particular location |
| <a href="#">show controllers backplane ethernet location detail</a> ,<br><a href="#">on page 518</a> | Displays detailed information about the backplane interfaces in a particular location. |

# show controllers backplane ethernet location detail

To display detailed information about the backplane interfaces in a particular location, use the **show controllers backplane ethernet location detail** command in EXEC mode.

**show controllers backplane ethernet location *node-id* detail**

**Syntax Description** This command has no keywords or arguments.

**Command Modes** EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.7.2 | 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 the output from the **show controllers backplane ethernet location detail** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet location 0/1/0 detail

FastEthernet0_1_0 is up
 Hardware is 10/100 Ethernet, H/W address is 5246.4800.0010
 Internet address is 10.0.0.16
 MTU 1514 bytes
 Encapsulation HFRIES (HFR Internal Ethernet Server)
 Mode : Full Duplex, Rate : 100Mb/s
 426422 packets input, 0 bytes, 1 total input drops
 14170 packets discarded (935122 bytes) in garbage collection
 16 packets discarded (5344 bytes) in recv processing
 Received 0 broadcast packets, 0 multicast packets
 Input errors: 0 CRC, 0 overrun, 0 alignment, 0 length, 0 collision
 440272 packets output, 0 bytes, 0 total output drops
 Output 0 broadcast packets, 0 multicast packets
 Output errors: 0 underruns, 0 aborts, 0 loss of carrier
```

**Table 35: show controllers backplane ethernet location detail Field Descriptions**

| Field            | Description                                                   |
|------------------|---------------------------------------------------------------|
| Hardware         | Provides the hardware type, followed by the hardware address. |
| Internet address | IP address of the interface.                                  |

| Field                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTU                                              | Maximum packet size, in bytes, that a particular interface can handle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Encapsulation                                    | Encapsulation method assigned to the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Mode                                             | Indicates the 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| packets discarded in garbage collection          | Number of packets and bytes discarded.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| packets discarded in rcv processing              | Number of packets and bytes discarded.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Received broadcast packets and multicast packets | Indicates the total number of broadcast and multicast packets received by the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Input errors                                     | <p>Displays the 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**show controllers backplane ethernet location detail**

| 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             | Indicates the total number of broadcast and multicast packets transmitted by the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Output errors      | <p>Displays the 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> |

**Related Commands**

| Command                                                                            | Description                                                                            |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <a href="#">show controllers backplane ethernet location brief</a> , on page 513   | display brief information about backplane Ethernet interfaces in a particular location |
| <a href="#">show controllers backplane ethernet location clients</a> , on page 516 | Displays information about client applications in a particular location.               |



# show controllers backplane ethernet location multicast groups

To display information about backplane interfaces that are in multicast groups in a particular location, use the **show controllers backplane ethernet location multicast groups** command in EXEC mode.

**show controllers backplane ethernet location multicast groups**

**Syntax Description** This command has no keywords or arguments.

**Command Modes** EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.7.2 | 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 the output from the **show controllers backplane ethernet location multicast groups** command, which displays detailed information about the backplane interfaces.

RP/0/RSP0/CPU0:router# **show controllers backplane ethernet location 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 36: show controllers backplane ethernet location 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 location brief</a> , on page 513   | display brief information about backplane Ethernet interfaces in a particular location |
| <a href="#">show controllers backplane ethernet location clients</a> , on page 516 | Displays information about client applications in a particular location.               |
| <a href="#">show controllers backplane ethernet location detail</a> , on page 518  | 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 EXEC mode.

**show controllers switch {0|1} ports**

## Syntax Description

{0|1}

Instance of the controller.

## Command Modes

EXEC

## Command History

| Release | Modification |
|---------|--------------|
|---------|--------------|

|               |                              |
|---------------|------------------------------|
| Release 3.7.2 | 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 the output from the **show controllers switch ports** command, which displays status about switch controller ports on switch 0:

```
RP/0/RSP0/CPU0:router# show controllers switch 0 ports
```

```
Ports Active on Switch 0
FE Port 2 STP State : FORWARDING (Connected to - 0/RP1)
FE Port 9 STP State : FORWARDING (Connected to - 0/SM0)
FE Port 10 STP State : FORWARDING (Connected to - 0/SM1)
GE Port 2 STP State : FORWARDING
```

**Table 37: show controllers switch ports Field Descriptions**

| Field        | Description                                                      |
|--------------|------------------------------------------------------------------|
| Ports Active | Indicates the active switch ports on the controller.             |
| FE Port      | Identifies the FE port.                                          |
| GE Port      | Identifies the GE port.                                          |
| STP State    | The state of the Spanning-Tree Protocol: FORWARDING or DISABLED. |

 show controllers switch ports

| Field        | Description                            |
|--------------|----------------------------------------|
| Connected to | The node that owns the specified port. |

**Related Commands**

| Command                                                    | Description                                                 |
|------------------------------------------------------------|-------------------------------------------------------------|
| <a href="#">show controllers switch stats, on page 525</a> | Displays statistics on all ports on the switch controllers. |

# show controllers switch stats

To display statistics on all ports on the switch controllers, use the **show controllers switch stats** command in EXEC mode.

**show controllers switch {0|1} stats**

| <b>Syntax Description</b> | <b>{0 1}</b> Instance of the controller.                                                                                               |         |              |               |                              |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|---------------|------------------------------|
| <b>Command Default</b>    | No default behavior or values.                                                                                                         |         |              |               |                              |
| <b>Command Modes</b>      | EXEC                                                                                                                                   |         |              |               |                              |
| <b>Command History</b>    | <table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>Release 3.7.2</td><td>This command was introduced.</td></tr> </table> | Release | Modification | Release 3.7.2 | This command was introduced. |
| Release                   | Modification                                                                                                                           |         |              |               |                              |
| Release 3.7.2             | 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 the output from the **show controllers switch stats** command, which displays information about switch controller statistics on all ports:

```
RP/0/RSP0/CPU0:router# show controllers switch 0 stats

Port 1 : Tx Frames 541417 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 2 : Tx Frames 820214 Tx Errors 0 Rx Frames 707494 Rx Errors 1
Port 3 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 4 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 5 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 6 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 7 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 8 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 9 : Tx Frames 633546 Tx Errors 0 Rx Frames 158250 Rx Errors 2
Port 10 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 11 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 12 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 13 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 14 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 15 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 16 : Tx Frames 0 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 25 : Tx Frames 541417 Tx Errors 0 Rx Frames 0 Rx Errors 0
Port 26 : Tx Frames 541330 Tx Errors 0 Rx Frames 587917 Rx Errors 0
```

**Table 38: show controllers switch stats Field Descriptions**

| Field            | Description                                         |
|------------------|-----------------------------------------------------|
| Tx Frames 541417 | Number of packets transmitted from the switch port. |
| Tx Errors 0      | Number of transmission errors.                      |
| Rx Frames 0      | Number of packets received on the switch port.      |
| Rx Errors 0      | Number of receive errors.                           |

**Related Commands**

| Command                                                    | Description                       |
|------------------------------------------------------------|-----------------------------------|
| <a href="#">show controllers switch ports, on page 523</a> | Displays status on a switch port. |



# Integrated Routing and Bridging Commands on the Cisco ASR 9000 Series Router

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This module describes the commands to configure Integrated Routing and Bridging (IRB) on the Cisco ASR 9000 Series Router.

- [interface bvi](#), [page 528](#)
- [routed interface bvi](#), [page 530](#)
- [show interfaces bvi](#), [page 532](#)

# interface bvi

To create a bridge-group virtual interface (BVI), use the **interface bvi** command in global configuration mode. To delete the BVI, use the **no** form of this command.

**interface bvi** *identifier*

**no interface bvi** *identifier*

## Syntax Description

|                   |                                               |
|-------------------|-----------------------------------------------|
| <i>identifier</i> | Number for the BVI interface from 1 to 65535. |
|-------------------|-----------------------------------------------|

## Command Default

No BVI interface is configured.

## Command Modes

Global configuration (config)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.1 | 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 BVI is a virtual interface within the router that acts like a normal routed interface. The BVI does not support bridging itself, but acts as a gateway for the corresponding bridge-domain to a routed interface within the router.

Aside from supporting a configurable MAC address, a BVI supports only Layer 3 attributes, and has the following characteristics:

- Uses a MAC address taken from the local chassis MAC address pool, unless overridden at the BVI interface.
- Is configured as an interface type using the **interface bvi** command and uses an IPv4 or IPv6 address that is in the same subnet as the hosts on the segments of the bridged domain. The BVI also supports secondary addresses.
- The BVI identifier is independent of the bridge-domain identifier. These identifiers do not need to correlate like they do in Cisco IOS software.
- Is associated to a bridge group using the **routed interface bvi** command.
- The following interface commands are supported on a BVI:
  - **arp purge-delay**



- **arp timeout**
- **bandwidth** (The default is 10 Gbps and is used as the cost metric for routing protocols for the BVI.)
- **ipv4**
- **ipv6** (Supported on Gigabit Ethernet line cards only in Cisco IOS XR Release 4.1)
- **mac-address**
- **mtu** (The default is 1514 bytes.)
- **shutdown**

- The BVI supports IP helper addressing and secondary IP addressing.

To display bridge group, bridge-domain, interface status, line protocol state, and packet counters for the specified BVI, use the **show l2vpn bridge domain interface bvi** form of the **show l2vpn bridge domain (VPLS)** command. To display the reason that a BVI is down, you can use the **detail** keyword option.

## Task ID

| Task ID   | Operation   |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to create a BVI interface and configure its IPv4 address:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface bvi 50
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.10.0.4 255.255.255.0
RP/0/RSP0/CPU0:router(config-if)# commit
```

## Related Commands

| Command                                                            | Description                                                                                                                             |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">routed interface bvi</a> , <a href="#">on page 530</a> | Associates the specified bridge group virtual interface (BVI) as the routed interface for the interfaces assigned to the bridge domain. |
| <a href="#">show interfaces bvi</a> , <a href="#">on page 532</a>  | Displays interface status, line protocol state, and packet counters for the specified BVI.                                              |
| <a href="#">show adjacency</a>                                     |                                                                                                                                         |
| <a href="#">show l2vpn bridge-domain (VPLS)</a>                    | Display information for the bridge ports such as attachment circuits and pseudowires for the specific bridge domains.                   |

## routed interface bvi

To associate the specified bridge group virtual interface (BVI) as the routed interface for the interfaces assigned to the bridge domain, use the **routed interface bvi** command in L2VPN bridge group bridge domain configuration mode. To remove the BVI as the routed interface for the interfaces assigned to the bridge domain, use the **no** form of this command.

**routed interface bvi** *identifier*

**no routed interface bvi** *identifier*

### Syntax Description

|                   |                                               |
|-------------------|-----------------------------------------------|
| <i>identifier</i> | Number for the BVI interface from 1 to 65535. |
|-------------------|-----------------------------------------------|

### Command Default

No routed interface is configured.

### Command Modes

L2VPN bridge group bridge domain configuration mode (config-l2vpn-bg-bd)

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.1 | 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.

- Only one BVI can be configured in any bridge domain.
- The same BVI can not be configured in multiple bridge domains.

### Task ID

| Task ID | Operation   |
|---------|-------------|
| l2vpn   | read, write |

### Examples

The following example shows association of a BVI interface numbered “50” on the bridge domain named “IRB”:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# l2vpn
RP/0/RSP0/CPU0:router(config-l2vpn)# bridge group 10
RP/0/RSP0/CPU0:router(config-l2vpn-bg)# bridge-domain IRB
```

```
RP/0/RSP0/CPU0:router(config-l2vpn-bg-bd) # routed interface bvi 50
RP/0/RSP0/CPU0:router(config-l2vpn-bg-bd) # commit
```

**Related Commands**

| Command                                          | Description                                                                                                              |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <a href="#">interface bvi, on page 528</a>       | Creates a BVI interface.                                                                                                 |
| <a href="#">l2vpn</a>                            | Enters L2VPN configuration mode.                                                                                         |
| <a href="#">bridge group (VPLS)</a>              | Creates a bridge group so that it can contain bridge domains and then to assign network interfaces to the bridge domain. |
| <a href="#">bridge-domain (VPLS)</a>             | Establishes a bridge domain, and enters L2VPN bridge group bridge domain configuration mode.                             |
| <a href="#">show interfaces bvi, on page 532</a> | Displays interface status, line protocol state, and packet counters for the specified BVI.                               |
| <a href="#">show adjacency</a>                   |                                                                                                                          |
| <a href="#">show l2vpn bridge-domain (VPLS)</a>  | Display information for the bridge ports such as attachment circuits and pseudowires for the specific bridge domains.    |

# show interfaces bvi

To display interface status, line protocol state, and packet counters for the specified BVI, use the **show interfaces bvi** command in EXEC mode.

**show interfaces bvi** *identifier* [**accounting** | **brief** | **description** | **detail** | **location** *location*]

## Syntax Description

|                                 |                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>identifier</i>               | Number for the BVI interface from 1 to 65535.                                                                                                         |
| <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 summary information about the interface.                                                                                          |
| <b>description</b>              | (Optional) Displays summary status information and the description for the interface.                                                                 |
| <b>detail</b>                   | (Optional) Displays detailed information about the interface. This is the default.                                                                    |
| <b>location</b> <i>location</i> | (Optional) Displays information the interface on the specified node. The <i>location</i> argument is entered in the <i>rack/slot/module</i> notation. |

## Command Default

Detailed information about the BVI interface is displayed.

## Command Modes

EXEC (#)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.1 | 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   | Operation |
|-----------|-----------|
| interface | read      |

## Examples

The following example shows sample output for the **show interfaces bvi** command:

```
RP/0/RSP0/CPU0:router# show interfaces bvi 50
Wed Feb 16 16:05:11.508 PST
BVI50 is up, line protocol is up
 Interface state transitions: 3
 Hardware is Bridge-Group Virtual Interface, address is 0000.0000.0002
 Description: IRB Routed Example
 Internet address is 172.16.0.1/24
 MTU 9014 bytes, BW 10000000 Kbit (Max: 10000000 Kbit)
 reliability 255/255, txload 0/255, rxload 0/255
 Encapsulation ARPA, loopback not set,
 ARP type ARPA, ARP timeout 04:00:00
 Last input 00:00:37, output 00:00:00
 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
 25643 packets input, 1641152 bytes, 0 total input drops
 0 drops for unrecognized upper-level protocol
 Received 0 broadcast packets, 25445 multicast packets
 208 packets output, 9472 bytes, 0 total output drops
 Output 8 broadcast packets, 0 multicast packets
```

**Table 39: show interfaces bvi Field Descriptions**

| Field                                | Description                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BVIx is                              | Displays the state of the specified BVI interface, where <i>x</i> is the number of the interface. The possible values are: administratively down, down, or up.                                                                                                                                                                                 |
| line protocol is                     | Displays the state of the line protocol for the BVI interface. The possible values are: administratively down, down, or up.<br><br><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). |
| Interface state transitions:         | Displays the number of times the interface has changed states.                                                                                                                                                                                                                                                                                 |
| Hardware is                          | Displays Bridge-Group Virtual Interface for a BVI.                                                                                                                                                                                                                                                                                             |
| address is                           | Layer 2 MAC address of the BVI.                                                                                                                                                                                                                                                                                                                |
| Description:                         | Displays the description of the interface when configured.                                                                                                                                                                                                                                                                                     |
| Internet address is <i>n.n.n.n/n</i> | Layer 3 IP address of the BVI in dotted decimal format.                                                                                                                                                                                                                                                                                        |

| Field         | Description                                                                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTU           | Displays the maximum transmission unit (MTU) for the interface. The MTU is the maximum packet size that can be transmitted over the interface. 1514 is the default.                         |
| BW x Kbit     | Displays the current bandwidth of the interface in kilobits per second.                                                                                                                     |
| Max:          | Displays the maximum bandwidth available on the interface in kilobits per second.                                                                                                           |
| 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 on the interface.                                                                                                                                                     |
| loopback      | Always displays “not set” for a BVI because loopbacks are not supported.                                                                                                                    |
| ARP type      | Address Resolution Protocol (ARP) type used on the interface.                                                                                                                               |
| ARP timeout   | ARP timeout in the format hours:mins:secs. This value is configurable using the <b>arp timeout</b> command.                                                                                 |
| Last input    | Number of hours, minutes, and seconds since the last packet was successfully received by an interface and processed locally on the router. Useful for knowing when a dead interface failed. |
| output        | Number of hours, minutes, and seconds since the last packet was successfully transmitted by the interface. Useful for knowing when a dead interface failed.                                 |

| Field                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last clearing of “show interface” counters | Time since the counters in this command were last cleared using the <b>clear counters</b> Exec command in hours:mins:secs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 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 will be 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 will be 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                                      | Number of bytes received on the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Field                                       | Description                                                                                                                                                                                                                                                      |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| total input drops                           | Total number of valid 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. This does not include drops due to unknown Layer 3 protocol. |
| 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 $x$ broadcast packets              | Total number of Layer 2 broadcast packets received on the interface. This is a subset of the total input packet count.                                                                                                                                           |
| multicast packets                           | Total number of Layer 2 multicast packets received on the interface. This is a subset of the total input packet count.                                                                                                                                           |
| packets output                              | Number of packets sent from the interface.                                                                                                                                                                                                                       |
| bytes                                       | Total number of bytes successfully sent from the interface.                                                                                                                                                                                                      |
| total output drops                          | Number of packets that were dropped before being transmitted.                                                                                                                                                                                                    |
| Output $x$ broadcast packets                | Number of Layer 2 broadcast packets transmitted on the interface. This is a subset of the total output packet count.                                                                                                                                             |
| multicast packets                           | Total number of Layer 2 multicast packets received on the interface. This is a subset of the total output packet count.                                                                                                                                          |

**Related Commands**

| Command                                         | Description                                                                                                           |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <a href="#">interface bvi</a> , on page 528     | Creates a BVI interface.                                                                                              |
| <a href="#">show l2vpn bridge-domain (VPLS)</a> | Display information for the bridge ports such as attachment circuits and pseudowires for the specific bridge domains. |





# Link Bundling Commands on the Cisco ASR 9000 Series Router

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This module provides command line interface (CLI) commands for configuring Link Bundle interfaces on the Cisco ASR 9000 Series Router.

- [backbone interface, page 539](#)
- [bundle-hash, page 541](#)
- [bundle id, page 546](#)
- [bundle load-balancing hash, page 548](#)
- [bundle load-balancing hash \(EFP\), page 550](#)
- [bundle maximum-active links, page 552](#)
- [bundle minimum-active bandwidth, page 554](#)
- [bundle minimum-active links, page 555](#)
- [bundle port-priority, page 557](#)
- [clear lacp counters, page 559](#)
- [hw-module load-balance bundle l2-service l3-params, page 561](#)
- [interface \(bundle\), page 563](#)
- [isolation recovery-delay, page 564](#)
- [lacp cisco enable, page 565](#)
- [lacp fast-switchover, page 567](#)
- [lacp packet-capture, page 569](#)
- [lacp period short, page 572](#)
- [lacp system priority, page 575](#)
- [member neighbor, page 577](#)
- [mlacp connect, page 578](#)
- [mlacp iccp-group, page 580](#)

- [mlacp node, page 581](#)
- [mlacp port-priority, page 582](#)
- [mlacp system mac, page 583](#)
- [mlacp system priority, page 585](#)
- [redundancy iccp group, page 587](#)
- [redundancy one-way, page 588](#)
- [show bundle, page 589](#)
- [show bundle brief, page 604](#)
- [show bundle load-balancing, page 607](#)
- [show bundle replication bundle-ether, page 611](#)
- [show iccp group, page 612](#)
- [show lacp bundle, page 614](#)
- [show lacp counters, page 617](#)
- [show lacp io, page 619](#)
- [show lacp packet-capture, page 622](#)
- [show lacp port, page 625](#)
- [show lacp system-id, page 628](#)
- [show mlacp, page 630](#)
- [show mlacp counters, page 632](#)

# backbone interface

To configure interchassis group ICCP backbone interface, use the **backbone interface** command in the redundancy group ICCP configuration mode. To return to the default behavior, use the **no** form of this command.

**backbone interface** *type interface-path-id*

**no backbone 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

None

## Command Modes

Redundancy group ICCP 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.

## Task ID

| Task ID         | Operations  |
|-----------------|-------------|
| config-services | read, write |

## Examples

This example shows how to configure interchassis group ICCP backbone interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# backbone interface GigabitEthernet
```

0/2/1/0

RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)#

#### Related Commands

| Command                                            | Description                                                        |
|----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">redundancy iccp group, on page 587</a> | Configures Inter Chassis Communication Protocol (ICCP) parameters. |

# 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*| **members** {**GigabitEthernet**| **TenGigabitEthernet**} *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>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.                                                                                                                                                                                     |
| <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 3.7.2 | 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.

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.

You can use the **show bundle** command to get IP address information.

[Table 40: bundle-hash Command Options, on page 542](#) 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 40: bundle-hash Command Options, on page 542](#).

**Table 40: bundle-hash Command Options**

| Option      | Information You Need to Provide                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L3/3-tuple  | <p>L3 information:</p> <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  | <p>L3 information:</p> <ul style="list-style-type: none"> <li>• Source IP address</li> <li>• Destination IP address</li> <li>• Protocol</li> </ul> <p>L4 information:</p> <ul style="list-style-type: none"> <li>• Source port</li> <li>• Destination port</li> </ul> <p>Platform-related information:</p> <ul style="list-style-type: none"> <li>• Router ID</li> <li>• Ingress interface</li> </ul> |
| Single pair | <p>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.</p> <p>The default is single mode.</p> <p>While in single mode, you may receive the following prompt:</p>                                                                       |
| Range       | <p>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.</p>                                                                                       |
| 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 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/RSP0/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/RSP0/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/RSP0/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: [GigabitEthernet | TenGigE]R/S/I/P
- bundle interface format: [Bundle-Ether]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: [GigabitEthernet | TenGigE]R/S/I/P
- bundle interface format: [Bundle-Ether]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</a> , <a href="#">on page 589</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 3.7.2 | 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 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**

This example shows how to add a port onto a bundle:

```
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet 0/1/5/0
RP/0/RSP0/CPU0:router(config-if)# bundle id 1
```

This example shows how to add an active LACP port onto an aggregated interface (or bundle):

```
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet 0/6/5/7
RP/0/RSP0/CPU0:router(config-if)# bundle id 5 mode active
```

**Related Commands**

| Command                                       | Description                                                                             |
|-----------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show bundle, on page 589</a>      | Displays information about configured bundles.                                          |
| <a href="#">show interfaces, on page 490</a>  | Displays statistics for all interfaces configured on the router or for a specific node. |
| <a href="#">show lacp bundle, on page 614</a> | Displays detailed information about LACP ports and their peers.                         |
| <a href="#">show lacp port, on page 625</a>   |                                                                                         |

# bundle load-balancing hash

To specify the hash function to be used for traffic being forwarded over a bundle interface, use the **bundle load-balancing hash** command in interface configuration mode. To return to the default, use the **no** form of the command.

**bundle load-balancing hash** {dst-ip| src-ip}

**no bundle load-balancing hash** {dst-ip| src-ip}

## Syntax Description

|               |                                                                  |
|---------------|------------------------------------------------------------------|
| <b>dst-ip</b> | Specifies a load-balancing hash based on destination IP address. |
| <b>src-ip</b> | Specifies a load-balancing hash based on source IP address.      |

## Command Default

The default platform hashes for the bundle are used. For IPv4 traffic, the default hash is based on router ID, source IP, destination IP, and if available, source and destination Layer 4 port.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.1.0 | This command was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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 load balancing hashes based on source IP address or destination IP address are used for MGSCP deployment models where traffic forwarded from the subscriber side of the network is based on source IP address, and traffic forwarded from the core side of the network is based on destination IP address.

## Task ID

| Task ID | Operation   |
|---------|-------------|
| bundle  | read, write |

## Examples

The following example configures load balancing on bundle members based on source IP address:

```
RP/0/RSP0/CPU0:router(config)#interface Bundle-Ether 100
RP/0/RSP0/CPU0:router(config-if)# bundle load-balancing hash src-ip
```

**Related Commands**

| Command                                                  | Description                                                                                                                                          |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">interface (bundle)</a> , on page 563         | Specifies or creates a new bundle and enters interface configuration mode for that bundle.                                                           |
| <a href="#">lacp cisco enable</a> , on page 565          | Enables use of Cisco-specific TLVs in addition to standard TLVs for negotiating and exchanging LACP information on link bundles.                     |
| <a href="#">show bundle</a> , on page 589                | Displays information about configured bundles.                                                                                                       |
| <a href="#">show bundle load-balancing</a> , on page 607 | Displays load balancing information, such as the ports, usage, weight, and distribution of traffic on individual members of a link bundle interface. |

## bundle load-balancing hash (EFP)

To configure all egressing traffic on a particular subinterface of a bundle to flow through the same physical member link, use the **bundle load-balancing hash (EFP)** command in subinterface configuration mode.

**bundle load-balancing hash** *hash-value* [**auto**]

**no bundle load-balancing hash** *hash-value* [**auto**]

### Syntax Description

|                   |                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>hash-value</i> | Numeric value that specifies the physical member link through which all egressing traffic in this bundle will flow. The values are 1 through 64. |
| <b>auto</b>       | The physical member link through which all egressing traffic on this bundle will flow is automatically chosen.                                   |

### Command Default

Ethernet flow point (EFP) load balancing is enabled.

### Command Modes

Subinterface configuration

### Command History

| Release       | Modification                                                            |
|---------------|-------------------------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                                            |
| Release 4.0.0 | The <i>hash-value</i> range was changed from an upper limit of 8 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.

This command is only available on an Ethernet Bundle subinterface with Layer 2 transport (**l2transport**) enabled.

This command allows the user to configure all egressing traffic on the fixed members of a bundle to flow through the same physical member link. If the active members of the bundle change, the traffic for the bundle may get mapped to a different physical link that has a hash value that matches the configured value.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| vlan    | read, write |

## Examples

The following example shows how to configure all egressing traffic on the fixed members of a bundle to flow through the same physical member link automatically.

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface bundle-ether 1.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# bundle load-balancing hash auto
```

The following example shows how to configure all egressing traffic on the fixed members of a bundle to flow through a specified physical member link.

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface bundle-ether 1.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# bundle load-balancing hash 1
```

## Related Commands

| Command                                                  | Description                                                                                                                                          |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">bundle-hash</a> , on page 541                | Displays the source and destination IP addresses for the member links.                                                                               |
| <a href="#">interface (bundle)</a> , on page 563         | Specifies or creates a new bundle and enters interface configuration mode for that bundle.                                                           |
| <a href="#">show bundle</a> , on page 589                | Displays information about configured bundles.                                                                                                       |
| <a href="#">show bundle load-balancing</a> , on page 607 | Displays load balancing information, such as the ports, usage, weight, and distribution of traffic on individual members of a link bundle interface. |

## 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*

**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. |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

No default behavior or values

### Command Modes

Interface configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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 **bundle maximum-active links** command is supported only for bundles that are not running LACP.

- Running Link Aggregation Control Protocol (LACP), and the **hot-standby** option is implemented.
- Not running LACP.

If the **bundle maximum-active links** command is issued, then only the highest-priority link within the bundle is active. The priority is based on the value from the **bundle port-priority** command, where a lower value is a higher priority. Therefore, we recommend that you configure a higher priority on the link that you want to be the active link.

- 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**

The following example shows how to set the number of active links required to bring up a specific bundle. In this example, the user sets the required number of active links required to bring up Ethernet bundle 5 to 2:

```
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RSP0/CPU0:router(config-if)# bundle maximum-active links 1
```

**Related Commands**

| Command                                                  | Description                                                             |
|----------------------------------------------------------|-------------------------------------------------------------------------|
| <a href="#">bundle minimum-active links, on page 555</a> | Sets the number of active links required to bring up a specific bundle. |
| <a href="#">show bundle, on page 589</a>                 | Displays information about configured bundles.                          |

# 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*

## Syntax Description

*kbps* Minimum bandwidth required before you can bring up a bundle. Range is from 1 through a number that is equivalent to the combined bandwidths of 8 TenGigabitEthernet interfaces.

## Command Default

The default setting is *kbps* = 1.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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, write |

## Examples

This 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:

```
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router(config-if)# bundle minimum-active bandwidth 620000
```

## Related Commands

| Command                                   | Description                                    |
|-------------------------------------------|------------------------------------------------|
| <a href="#">show bundle</a> , on page 589 | 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 3.7.2 | This command was introduced.                        |
| Release 4.0.0 | The command range maximum was changed from 8 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 2 links must be active before the bundle can be brought up:

```
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RSP0/CPU0:router(config-if)# bundle minimum-active links 2
```

**Related Commands**

| Command                                                  | Description                                    |
|----------------------------------------------------------|------------------------------------------------|
| <a href="#">bundle maximum-active links, on page 552</a> |                                                |
| <a href="#">show bundle, on page 589</a>                 | Displays information about configured bundles. |

# bundle port-priority

To configure Link Aggregation Control Protocol (LACP) priority for a port , enter the **bundle port-priority** command in interface configuration mode. To return to the default LACP 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 3.7.2 | 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 LACP priority value forms part of the port ID, which is transmitted within the LACP packets that are exchanged with the peer. The peer uses the LACP packets to determine whether a given port should carry traffic for the bundle.

For Multi-Gigabit Service Control Point (MGSCP), the **bundle port-priority** command applies to working links.



### Note

A lower LACP value is a higher LACP priority for the port.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

**Examples**

The following example shows how to configure LACP priority on a port:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# bundle port-priority 1
```

**Related Commands**

| Command                                          | Description                                                     |
|--------------------------------------------------|-----------------------------------------------------------------|
| <a href="#">bundle id, on page 546</a>           | Adds a port to an aggregated interface or bundle.               |
| <a href="#">show lacp bundle, on page 614</a>    | Displays detailed information about LACP ports and their peers. |
| <a href="#">show lacp port, on page 625</a>      |                                                                 |
| <a href="#">show lacp system-id, on page 628</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*] **port** {**GigabitEthernet** *interface-path-id*| **TenGigE** *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>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. |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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         | execute     |
| basic-services | read, write |

 clear lacp counters**Examples**

The following example shows how to clear LACP counters:

```
RP/0/RSP0/CPU0:router# clear lacp counters
```

**Related Commands**

| Command                                         | Description               |
|-------------------------------------------------|---------------------------|
| <a href="#">show lacp counters, on page 617</a> | Displays LACP statistics. |



# hw-module load-balance bundle l2-service l3-params



## Note

Effective with Cisco IOS XR Release 4.0.1, the **hw-module load-balance bundle l2-service l3-params** command is replaced by the **load-balancing flow** L2VPN configuration command. See the **load-balancing flow** command in the *Cisco ASR 9000 Series Aggregation Services Router L2VPN and Ethernet Services Command Reference* for more information.

To configure load balancing for L2 services using L3 parameters, use the **hw-module load-balance bundle l2-service l3-params** command in global configuration mode. To disable load balance L2 services, use the **no** form of this command.

**hw-module load-balance bundle l2-service l3-params**

**no hw-module load-balance bundle l2-service l3-params**

## 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 3.9.1 | This command was introduced.                                         |
| Release 4.0.0 | This command was replaced by the <b>load-balancing flow</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.

This command enables the L2 service-specific load-balancing for bundle Ethernet Flow Points (EFPs). By default, bundle load-balancing is done based on the MAC SA/DA fields in the packet header. When L2 service-specific load-balancing is configured, all traffic egressing bundle EFPs are load-balanced based on the IPv4 source and destination addresses in the packet. If the packet does not have IPv4 addresses, the default load-balancing is used.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| root-lr | read, write |

## Examples

The following example shows how to configure load balancing for L2 services using L3 parameters:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# hw-module load-balance bundle l2-service l3-params
```

# 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-id*

**no interface Bundle-Ether** *bundle-id*

## Syntax Description

|                     |                                                             |
|---------------------|-------------------------------------------------------------|
| <b>Bundle-Ether</b> | Specifies or creates an Ethernet 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 3.7.2 | 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

This example shows how to create an Ethernet bundle and enter interface configuration mode:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 3
RP/0/RSP0/CPU0:router(config-if)#
```

## Related Commands

| Command                                   | Description                                    |
|-------------------------------------------|------------------------------------------------|
| <a href="#">show bundle</a> , on page 589 | Displays information about configured bundles. |

# isolation recovery-delay

To specify a delay before clearing the isolation condition after recovery from failure, use the **isolation recovery-delay** command in the redundancy group ICCP configuration mode. To return to the default value, use the **no** form of this command.

**isolation recovery-delay** *seconds*

**no isolation recovery-delay** *seconds*

## Syntax Description

*seconds* Recovery delay in seconds.

## Command Default

By default, the delay is set to 180 seconds.

## Command Modes

Redundancy group ICCP 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.

## Examples

This example shows how to configure ICCP parameters:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# isolation recovery-delay 35
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)#
```

## Task ID

| Task ID         | Operations  |
|-----------------|-------------|
| config-services | read, write |

## Related Commands

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">redundancy iccp group</a> , on page 587 | Configures Inter Chassis Communication Protocol (ICCP) parameters. |

# lacp cisco enable

To enable use of Cisco-specific TLVs in addition to standard TLVs for negotiating and exchanging LACP information on link bundles, use the **lacp cisco enable** command in interface configuration mode. To return to the default, use the **no** form of the command.

**lacp cisco enable [link-order signaled]**

**no lacp cisco enable [link-order signaled]**

## Syntax Description

|                            |                                                                          |
|----------------------------|--------------------------------------------------------------------------|
| <b>link-order signaled</b> | (Optional) Includes link order numbering as part of the LACP processing. |
| <b>Note</b>                | This keyword is required for MGSCP.                                      |

## Command Default

Cisco type-length values (TLVs) are not used.

## Command Modes

Interface configuration (config-if)

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.1.0 | 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.

The **lacp cisco enable link-order signaled** command is required on bundle interfaces supporting deployment of Multi-Gigabit Service Control Point (MGSCP), and must be configured symmetrically on both the access and core bundle. When link order signaling is enabled, then only one set of Link Ordering Numbers (LONs) are used for the bundle, and LACP processing of LONs is enabled for load balancing tables.

The LONs from the highest priority LACP system take precedence. Where both systems have the same LACP system ID (for example, with MGSCP where both ends of the bundle terminate on the same device), the LONs from the bundle interface with the numerically lowest bundle ID take precedence.

When **lacp cisco enable** command is configured without link order signaling, then links are assigned ordering numbers as they become active and keep them until the link goes inactive. The numbers are exchanged using LACP, but they are not used.

## Task ID

| Task ID | Operation   |
|---------|-------------|
| bundle  | read, write |

## Examples

The following example enables the use of Cisco TLVs to include link order numbering as part of the LACP processing on this bundle:

```
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RSP0/CPU0:router(config-if)# lacp cisco enable link-order signaled
```

## Related Commands

| Command                                                          | Description                                                                                |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">interface (bundle)</a> , <a href="#">on page 563</a> | Specifies or creates a new bundle and enters interface configuration mode for that bundle. |

# 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)

| 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 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 552 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/RSP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RSP0/CPU0:router(config-if)# no lacp fast-switchover
```

**Related Commands**

| Command                                                  | Description |
|----------------------------------------------------------|-------------|
| <a href="#">bundle maximum-active links, on page 552</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} {tengige interface-path-id number-of-packets}
```

To stop capturing LACP packets or to clear captured LACP packets, use the **lacp packet-capture stop** or **lacp packet-capture clear** command in EXEC mode.

```
{lacp packet-capture [bundle-ether bundle-id] [gigabitethernet 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>GigabitEthernet</b>   | Gigabit Ethernet 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

```
RP/0/RSP0/CPU0:router# lACP packet-capture pos 0/1/0/0 100
```

```
RP/0/RSP0/CPU0:router# lACP packet-capture pos 0/1/0/0 stop
```

```
RP/0/RSP0/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/RSP0/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/RSP0/CPU0:router# lACP packet-capture gigabitethernet 0/2/0/0 stop
```

**Related Commands**

| Command                                               | Description                                                                                                          |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <a href="#">show lacp io, on page 619</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 622</a> | Displays the contents of LACP packets that are sent and received on an interface.                                    |
| <a href="#">lacp period short, on page 572</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 3.9.0 | 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 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short
RP/0/RSP0/CPU0:router(config-if)# commit
```

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short
RP/0/RSP0/CPU0:router(config-if)# commit
```

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

**Related Commands**

| Command                                   | Description                                                                                                          |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <a href="#">show lacp io, on page 619</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 622</a> | Displays the contents of LACP packets that are sent and received on an interface. |
| <a href="#">lacp packet-capture, on page 569</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.

**lACP system priority** *priority*

**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

The default setting is *priority* = 32768.

## Command Modes

Global configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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/RSP0/CPU0:router(config)# lACP system priority 100
```

**Related Commands**

| Command                                          | Description                                                     |
|--------------------------------------------------|-----------------------------------------------------------------|
| <a href="#">show lacp system-id, on page 628</a> | Displays the local system ID used by the LACP.                  |
| <a href="#">show lacp bundle, on page 614</a>    | Displays detailed information about LACP ports and their peers. |
| <a href="#">show lacp port, on page 625</a>      |                                                                 |



# member neighbor

To configure interchassis group ICCP members, use the **member neighbor** command in redundancy ICCP group configuration mode. To return to the default behavior, use the **no** form of this command.

**member neighbor** *neighbor-ip-address*

**no member neighbor** *neighbor-ip-address*

| Syntax Description                                                  | <i>neighbor-ip-address</i> Specifies the ICCP member neighbor IP address.                                                                                                                                                                                                                                                                      |  |         |              |                                                                     |                                                                    |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|---------------------------------------------------------------------|--------------------------------------------------------------------|
| Command Default                                                     | None                                                                                                                                                                                                                                                                                                                                           |  |         |              |                                                                     |                                                                    |
| Command Modes                                                       | Redundancy ICCP group configuration                                                                                                                                                                                                                                                                                                            |  |         |              |                                                                     |                                                                    |
| Command History                                                     | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>Release 4.0.0</td><td>This command was introduced.</td></tr></table>                                                                                                                                                                                                              |  | Release | Modification | Release 4.0.0                                                       | This command was introduced.                                       |
| 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                                                             | <table><tr><th>Task ID</th><th>Operations</th></tr><tr><td>config-services</td><td>read, write</td></tr></table>                                                                                                                                                                                                                               |  | Task ID | Operations   | config-services                                                     | read, write                                                        |
| Task ID                                                             | Operations                                                                                                                                                                                                                                                                                                                                     |  |         |              |                                                                     |                                                                    |
| config-services                                                     | read, write                                                                                                                                                                                                                                                                                                                                    |  |         |              |                                                                     |                                                                    |
| Examples                                                            | The following example shows how to configure interchassis group ICCP members:<br><br>RP/0/RSP0/CPU0:router# <b>configure</b><br>RP/0/RSP0/CPU0:router(config)# <b>redundancy iccp group 10</b><br>RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# <b>member neighbor 10.1.1.1</b><br>RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# |  |         |              |                                                                     |                                                                    |
| Related Commands                                                    | <table><tr><th>Command</th><th>Description</th></tr><tr><td><a href="#">redundancy iccp group</a>, <a href="#">on page 587</a></td><td>Configures Inter Chassis Communication Protocol (ICCP) parameters.</td></tr></table>                                                                                                                    |  | Command | Description  | <a href="#">redundancy iccp group</a> , <a href="#">on page 587</a> | Configures Inter Chassis Communication Protocol (ICCP) parameters. |
| Command                                                             | Description                                                                                                                                                                                                                                                                                                                                    |  |         |              |                                                                     |                                                                    |
| <a href="#">redundancy iccp group</a> , <a href="#">on page 587</a> | Configures Inter Chassis Communication Protocol (ICCP) parameters.                                                                                                                                                                                                                                                                             |  |         |              |                                                                     |                                                                    |

# mlacp connect

To specify configuration options for connecting to mLACP peers, use the **mlacp connect** command in the redundancy ICCP group configuration mode. To disable this feature, use the **no** form of this command.

**mlacp connect timeout** *seconds*

**no mlacp connect timeout** *seconds*

## Syntax Description

|                |                                                                   |
|----------------|-------------------------------------------------------------------|
| <b>timeout</b> | Specifies the time to wait before assuming mLACP peer is down.    |
| <i>seconds</i> | Number of seconds to wait before assuming the mLACP peer is down. |

## Command Default

No default behavior or values

## Command Modes

Redundancy ICCP group 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.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

## Examples

This example shows how to specify configuration options for connecting to mLACP peers:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp connect timeout 100
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)#
```

## Related Commands

|                              |                             |
|------------------------------|-----------------------------|
| <b>redundancy iccp group</b> | Configures ICCP parameters. |
|------------------------------|-----------------------------|



# mlacp iccp-group

To configure ICCP redundancy group for a bundle, use the **mlacp iccp-group** command in bundle interface configuration mode. To return to the default value, use the **no** form of this command.

**mlacp iccp-group** *group-id*

**no mlacp iccp-group** *group-id*

## Syntax Description

|                 |                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| <i>group-id</i> | Specifies the ICCP redundancy group in which the bundle should operate. The group-id value ranges between 1-4294967295. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|

## Command Default

The bundle behaves as a single chassis LAG.

## Command Modes

Bundle interface 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.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| Bundle  | read, write |

## Examples

The following example shows how to configure an ICCP redundancy group for a bundle:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 30
RP/0/RSP0/CPU0:router(config-if)# mlacp iccp-group 200
RP/0/RSP0/CPU0:router(config-if)#
```

# mlacp node

To configure the mLACP node ID to be used in the ICCP group, use the **mlacp node** command in the redundancy ICCP group configuration mode. To return to the default value, use the **no** form of this command.

**mlacp node** *node-id*

**no mlacp node** *node-id*

## Syntax Description

|                |                                                                                                          |
|----------------|----------------------------------------------------------------------------------------------------------|
| <i>node-id</i> | Specifies the unique node ID in the ICCP group for this system. The node-id value ranges between 0 to 7. |
|----------------|----------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Redundancy ICCP group 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.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

## Examples

This example shows how to configure the mLACP node ID to be used in the ICCP group:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp node 3
```

## Related Commands

|                              |                             |
|------------------------------|-----------------------------|
| <b>redundancy iccp group</b> | Configures ICCP parameters. |
|------------------------------|-----------------------------|

# mlacp port-priority

To set the priority for all member links, use the **mlacp port-priority** command in bundle interface configuration mode. To return to the default value, use the **no** form of this command.

**mlacp port-priority** *priority*

**no mlacp port-priority** *priority*

## Syntax Description

|                 |                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------|
| <i>priority</i> | Specifies the priority for member ports. The priority value ranges between 1-65535. A lower value indicates higher priority. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Bundle interface 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.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| Bundle  | read, write |

## Examples

This example shows how to set the priority for all member links:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 30
RP/0/RSP0/CPU0:router(config-if)# mlacp port-priority 20
```

# mlacp system mac

To configure the LACP system ID to be used in an ICCP group, use the **mlacp system mac** command in the redundancy ICCP group configuration mode. To return to the default value, use the **no** form of this command.

**mlacp system mac** *mac-id*

**no mlacp system mac** *mac-id*

## Syntax Description

|               |                                         |
|---------------|-----------------------------------------|
| <i>mac-id</i> | Specifies the unique ID for the system. |
| <b>Note</b>   | A non-zero value is permitted.          |

## Command Default

No default behavior or values

## Command Modes

Redundancy ICCP group 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.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

## Examples

The following example shows how to configure the LACP system ID to be used in an ICCP group:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp system mac 1.1.1
```

## Related Commands

|                              |                             |
|------------------------------|-----------------------------|
| <b>redundancy iccp group</b> | Configures ICCP parameters. |
|------------------------------|-----------------------------|

 mlacp system mac



# mlacp system priority

To configure the LACP system priority to be used in the ICCP group, use the **mlacp system priority** command in the redundancy ICCP group configuration mode. To return to the default value, use the **no** form of this command.

**mlacp system priority** *priority*

**no mlacp system priority** *priority*

## Syntax Description

|                 |                                        |
|-----------------|----------------------------------------|
| <i>priority</i> | Specifies the priority for the system. |
| <b>Note</b>     | Lower value indicates higher priority. |

## Command Default

No default behavior or values

## Command Modes

Redundancy ICCP group 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.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| bundle  | read, write |

## Examples

This example shows how to configure the LACP system priority to be used in the ICCP Group:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp system priority 10
```

mlacp system priority

Related Commands

|                       |                             |
|-----------------------|-----------------------------|
| redundancy iccp group | Configures ICCP parameters. |
|-----------------------|-----------------------------|

# redundancy iccp group

To configure Inter Chassis Communication Protocol (ICCP) parameters, use the **redundancy iccp group** command in the global configuration mode. To return to the default, use the **no** form of this command.

**redundancy iccp group** *group-id*

**no redundancy iccp group** *group-id*

## Syntax Description

|                 |                          |
|-----------------|--------------------------|
| <i>group-id</i> | Specifies ICCP group ID. |
|-----------------|--------------------------|

## Command Default

ICCP redundancy is disabled.

## Command Modes

Global configuration mode

## 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  |
|-----------------|-------------|
| config-services | read, write |

## Examples

The following example shows how to configure ICCP parameters:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)#
```

## redundancy one-way

To enforce one-way pseudowire redundancy behavior when the redundancy group is configured, use the **redundancy one-way** command in the L2VPN pseudowire class configuration mode. To return to the default, use the **no** form of this command.

**redundancy one-way**

**no redundancy one-way**

This command has no keywords or arguments.

### Command Default

One-way redundancy is disabled.

### Command Modes

L2VPN pseudowire class 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.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| l2vpn   | read, write |

### Examples

The following example shows how to :

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# l2vpn
RP/0/RSP0/CPU0:router(config-l2vpn)# pw-class class_mpls
RP/0/RSP0/CPU0:router(config-l2vpn-pwc)# encapsulation mpls
RP/0/RSP0/CPU0:router(config-l2vpn-pwc-mpls)# redundancy one-way
RP/0/RSP0/CPU0:router(config-l2vpn-pwc-mpls)#
```

### Related Commands

| Command               | Description                      |
|-----------------------|----------------------------------|
| <a href="#">l2vpn</a> | Enters L2VPN configuration mode. |

# 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 3.7.2 | This command was introduced.                                                                                                                                                           |
| Release 3.8.0 | The <b>reasons</b> keyword was removed.                                                                                                                                                |
| Release 4.0.0 | The output for this command was replaced with a new format.                                                                                                                            |
| Release 4.1.0 | The following output fields were added: <ul style="list-style-type: none"><li>• Load-balancing</li><li>• Link order signaling</li><li>• Hash type</li><li>• Cisco extensions</li></ul> |
| Release 4.2.0 | Support for Bundle-POS 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 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-Etherbundle-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/RSP0/CPU0:router# show bundle
```

```
Bundle-Ether 2
 Status: Up
 Local links <active/standby/configured>: 1 / 0 / 1
 Local bandwidth <effective/available>: 100000 (100000) kbps
 MAC address (source): 1234.4321.1111 (Gi0/0/0/1)
 Minimum active links / bandwidth: 1 / 500 kbps
 Maximum active links: 32
 Wait-while timer: 2000 ms
 Load-balancing: Default
 LACP: Operational
 Flap suppression timer: 2500 ms
 Cisco extensions: Disabled
 mLACP: Operational
 Interchassis group: 3
 Foreign links <active/configured>: 1 / 1
 Switchover type: Revertive
 Recovery delay: 300 s
 Maximize threshold: 2 links
 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 |
|------------------|--------------|-------------|----------------|-----------|
| Gi0/0/0/1        | Local        | Active      | 0x8000, 0x0001 | 100000    |
| MyFirstInterface | 10.10.10.123 | Negotiating | 0x8000, 0x0032 | 100000    |

```
Bundle-Ether 3
 Status: Up
 Local links <active/standby/configured>: 1 / 0 / 1
 Local bandwidth <effective/available>: 100000 / 100000 kbps
 MAC address (source): 1234.4321.2222 (chassis pool)
 Minimum active links / bandwidth: 1 / 500 kbps
 Maximum active links: 32 (from partner)
 Wait-while timer: 100 ms
 Load-balancing:
 Link order signaling: Operational
 Hash type: Src-IP
 LACP: Operational
 Flap suppression timer: 120 s
 Cisco extensions: Enabled
 mLACP: Not configured
 IPv4 BFD: Not operational
```

| Port      | Device | State  | Port ID        | B/W, kbps |
|-----------|--------|--------|----------------|-----------|
| Gi0/0/0/2 | Local  | Active | 0x8000, 0x0002 | 100000    |

**Table 41: show bundle Field Descriptions**

| Field                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bundle- <i>typenumber</i>                | Full name of the bundle interface, where <i>type</i> is Ether (Ethernet) , followed by the configured <i>number</i> of the bundle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 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>• mLACP cold standby—The bundle is acting as a multichassis LACP Standby device, but the higher layers are not synchronized.</li> <li>• mLACP hot standby—The bundle is Up on the mLACP peer device, and the local device is ready to take over if that bundle goes down on the peer.</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 <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.</li> <li>• <i>y</i>—Number of links in Standby state on the bundle.</li> <li>• <i>z</i>—Total number of links configured on the bundle.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Field                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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>                                                                                                                                                                                                                           |
| MAC address (source):                  | <p>Layer 2 MAC address on the bundle interface in the format <code>xxxx.xxxx.xxxx</code>. 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 <math>x / y</math> kbps, with the following values:</p> <ul style="list-style-type: none"> <li><math>x</math>—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><math>y</math>—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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



| Field                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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:       | <p>Type of load balancing in use on the bundle, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Default—The default load balancing method for the system is used on the bundle, and the load balancing sub-fields are not displayed.</li> <li>• No value—Another load balancing method is in use on the bundle, with information shown in the related sub-fields of the display.</li> </ul>                                                                                                                                                                                                                                                                                                        |
| Link order signaling: | <p>Displays whether or not link order signaling is operating on the bundle, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Operational—Link ordering for load balancing is working through the exchange of an additional, Cisco-specific LACP type length value (TLV) that contains the ordering information.</li> <li>• Not operational—A consistent set of link ordering numbers (LONs) has not been received by a higher priority partner, or the LONs to be made active are not consistent with the maximum number of active links supported by the bundle.</li> </ul> <p><b>Note</b> Link order signaling is required for the deployment of Multi-Gigabit Service Control Point (MGSCP).</p> |
| Hash type:            | <p>The information to be used for the load balancing hash on the bundle, with the following possible values:</p> <ul style="list-style-type: none"> <li>• Dst-IP—The load balancing on the bundle is based on the packet's destination IP address.</li> <li>• Src-IP—The load balancing on the bundle is based on the packet's source IP address.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                        |

| 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>Displays whether or not the bundle is operating using Multichassis Link Aggregation (MC-LAG), with the following possible values:</p> <ul style="list-style-type: none"> <li>• Operational—All required configuration has been committed for MC-LAG and mLACP is in use on the bundle.</li> <li>• Not operational—mLACP is not working because some mandatory configuration for MC-LAG is missing on the bundle or on the active members of the bundle.</li> <li>• Not configured—None of the mandatory configuration for MC-LAG has been committed on the bundle, and the mLACP sub-fields are not displayed.</li> </ul> |

| Field                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ICCP group:                        | Number of the Interchassis Communication Protocol group (if configured) in which the bundle participates. Otherwise, "Not configured" is displayed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Role                               | ICCP redundancy role of the local device for this mLACP bundle, with the following possible values: <ul style="list-style-type: none"> <li>• Active—Bundle is currently active locally.</li> <li>• Standby—Bundle is a backup locally.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Foreign links <active/configured>: | The number of links on the remote device in the format $x/y$ , with the following values: <ul style="list-style-type: none"> <li>• <math>x</math>—Number of links in Active state on the remote bundle.</li> <li>• <math>y</math>—Total number of links configured on the remote bundle.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Switchover type:                   | Method of performing an mLACP switchover on the bundle with the following possible values: <ul style="list-style-type: none"> <li>• Brute force—Trigger the failover by marking member(s) as Not Aggregatable instead of using dynamic priority management. This is the only possible method of control when the dual-homed device (DHD) is the higher-priority system. Only applies to mLACP bundles.</li> <li>• Non-revertive—This is the default. Dynamic priority management is used, where the bundle does not fail back to the originally active point of attachment (PoA) except when a subsequent failure occurs.</li> <li>• Revertive—Dynamic priority management is used, but the higher-priority device (based on the configured port priorities for the bundle) is always Active unless it has encountered a failure. This means that if a failure is encountered triggering a switchover, once the failure condition is cleared the initially-active links become active again.</li> </ul> <p>The switchover type can be changed from the default behavior using the <b>mlacp switchover type</b> command,</p> |

| Field               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recovery delay:     | Number of seconds (s) to delay becoming the active mLACP device after recovering from a failure, using the <b>mlacp switchover recovery delay</b> command. "None" is displayed when the <b>mlacp switchover recovery delay</b> command is not configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Maximize threshold: | Threshold value below which mLACP switchovers are triggered to allow the bundle to reach the configured maximum number of active links or bandwidth (using the <b>mlacp switchover maximize</b> command), with the following possible values: <ul style="list-style-type: none"> <li>• <i>x</i> links—Number of active links used as the maximum threshold target to be maintained as a trigger for an mLACP switchover on a bundle.</li> <li>• <i>y</i> kbps—Bandwidth in kilobits per second used as the target threshold to be maintained as a trigger for an mLACP switchover on a bundle.</li> <li>• Not configured—The <b>mlacp switchover maximize</b> command is not configured. mLACP switchovers are based on the minimum active links or bandwidth for the bundle.</li> </ul> |
| IPv4 BFD:           | Displays whether or not IPv4-based bidirectional forwarding (BFD) is operating on the bundle interface, with the following possible values: <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>                                                                                                                                                                  |

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 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>                                                         |
| 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>                                                                                                                                                                                                                                                                                                                     |
| 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> |

| Field                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Port                         | Name of the local interface port that is configured to be a bundle member, or a foreign interface received by an mLACP peer device. The possible values are the shortened interface name or a text string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Device                       | <p>Label Distribution Protocol (LDP) address of the device where the interface port is located, with the following possible values:</p> <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>                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State        | <p>Status of the port, with one of the following possible values</p> <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      | <p>ID of the interface port in the format <i>x/y</i>, with the following values:</p> <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 42: 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. |

| Reason                                                               | Description                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                                              |
| 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.                                                                                 |



| Reason                                                            | Description                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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; LACPDU 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.                                                                                                                       |
| 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.                                                                                                                                    |

| Reason                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 563 | 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** These 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/RSP0/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 43: show bundle brief Field Descriptions, on page 605 describes the fields shown in the display.

**Table 43: 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> </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>• mLACP cold standby—The bundle is acting as a multichassis LACP Standby device, but the higher layers are not synchronized.</li> <li>• mLACP hot standby—The bundle is Up on the mLACP peer device, and the local device is ready to take over if that bundle goes down on the peer.</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> , on page 589 | Displays information about configured bundles. |

# show bundle load-balancing

To display load balancing information, such as the ports, usage, weight, and distribution of traffic on individual members of a link bundle interface, use the **show bundle load-balancing** command in EXEC mode.

**show bundle load-balancing** [**Bundle-Ether** |**Bundle-POS** *bundle-id*] [**brief**] [**detail**] [**location**]

## 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.                                          |
| <b>brief</b>                         | (Optional) Displays summary information for all nodes or for a specified location.                                                                          |
| <b>detail</b>                        | (Optional) Displays detailed information for all nodes or for a specified location.                                                                         |
| <b>location</b>                      | (Optional) Specifies the location of the node.<br><br>For more information about the syntax for the router, use the question mark (?) online help function. |

## Command Default

When the **brief** or **detail** keywords are used and no **location** is specified, information is displayed for all nodes on the router.

## Command Modes

EXEC

## Command History

| Release       | Modification                                  |
|---------------|-----------------------------------------------|
| Release 3.9.0 | This command was introduced.                  |
| Release 4.2.0 | The <b>Bundle-POS</b> keyword was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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 examples show how to use the **show bundle load-balancing** command and its various keywords:

```
RP/0/RSP0/CPU0:router# show bundle load-balancing brief
```

```
Node: 0/0/CPU0
```

| Interface         | Count | Sub-Intf<br>Count | Member<br>Count | Total<br>Wgt. |
|-------------------|-------|-------------------|-----------------|---------------|
| Bundle-Ether12345 | 10    |                   | 63              | 134           |

```
Node: 0/1/CPU0
```

| Interface         | Count | Sub-Intf<br>Count | Member<br>Count | Total<br>Wgt. |
|-------------------|-------|-------------------|-----------------|---------------|
| Bundle-Ether12345 | 10    |                   | 63              | 134           |

```
show bundle load-balancing brief location 0/0/CPU0
```

```
Node: 0/0/CPU0
```

| Interface         | Count | Sub-Intf<br>Count | Member<br>Count | Total<br>Wgt. |
|-------------------|-------|-------------------|-----------------|---------------|
| Bundle-Ether12345 | 10    |                   | 63              | 134           |

```
RP/0/RSP0/CPU0:router# show bundle load-balancing location 0/0/CPU0
```

```
Bundle-Ether12345
```

```
Type: Ether (L2)
Members: 63
Total Weighting: 134
Sub-interfaces: 10
```

```
Member Information:
```

| Port      | ID | BW |
|-----------|----|----|
| Gi0/0/0/1 | 0  | 10 |
| Gi0/0/0/3 | 1  | 1  |

```
[...]
```

```
Platform Information:
```

```
Bundle Summary Information:
```

|                   |                   |              |             |
|-------------------|-------------------|--------------|-------------|
| Interface         | : Bundle-Ether100 | Ifhandle     | : 0xa0000a0 |
| Lag ID            | : 1               | Virtual Port | : 20        |
| Number of Members | : 4               | Local to LC  | : 1         |

```
Member Information:
```

| ul_id | Interface  | ifhandle  | SFP | port | slot |
|-------|------------|-----------|-----|------|------|
| 0     | Gi0/4/0/3  | 0x8000100 | 16  | 3    | 4    |
| 1     | Gi0/4/0/10 | 0x80002c0 | 17  | 10   | 4    |
| 2     | Gi0/4/0/17 | 0x8000480 | 17  | 17   | 4    |
| 3     | Gi0/4/0/24 | 0x8000640 | 18  | 4    | 4    |

```
Bundle Table Information:
```

```
[NP 0]:
```

```
Unicast (Global) LAG table | Multicast (Local) LAG table
```



| idx | local | ul_id | SFP | port |  | idx | local | ul_id | SFP | port |
|-----|-------|-------|-----|------|--|-----|-------|-------|-----|------|
| 1   | 1     | 0     | 16  | 3    |  | 1   | 1     | 0     | 16  | 3    |
| 2   | 1     | 1     | 17  | 10   |  | 2   | 1     | 1     | 17  | 10   |
| 3   | 1     | 2     | 17  | 17   |  | 3   | 1     | 2     | 17  | 17   |
| 4   | 0     | 3     | 18  | 4    |  | 4   | 0     | 3     | 18  | 4    |
| 5   | 1     | 0     | 16  | 3    |  | 5   | 1     | 0     | 16  | 3    |
| 6   | 1     | 1     | 17  | 10   |  | 6   | 1     | 1     | 17  | 10   |
| 7   | 1     | 2     | 17  | 17   |  | 7   | 1     | 2     | 17  | 17   |
| 8   | 0     | 3     | 18  | 4    |  | 8   | 0     | 3     | 18  | 4    |

[NP 1]:

| Unicast (Global) LAG table |       |       |     |      |  | Multicast (Local) LAG table |       |       |     |      |
|----------------------------|-------|-------|-----|------|--|-----------------------------|-------|-------|-----|------|
| idx                        | local | ul_id | SFP | port |  | idx                         | local | ul_id | SFP | port |
| 1                          | 0     | 0     | 16  | 3    |  | 1                           | 0     | 0     | 16  | 3    |
| 2                          | 0     | 1     | 17  | 10   |  | 2                           | 0     | 1     | 17  | 10   |
| 3                          | 0     | 2     | 17  | 17   |  | 3                           | 0     | 2     | 17  | 17   |
| 4                          | 1     | 3     | 18  | 4    |  | 4                           | 1     | 3     | 18  | 4    |
| 5                          | 0     | 0     | 16  | 3    |  | 5                           | 0     | 0     | 16  | 3    |
| 6                          | 0     | 1     | 17  | 10   |  | 6                           | 0     | 1     | 17  | 10   |
| 7                          | 0     | 2     | 17  | 17   |  | 7                           | 0     | 2     | 17  | 17   |
| 8                          | 1     | 3     | 18  | 4    |  | 8                           | 1     | 3     | 18  | 4    |

Bundle-POS3

Type: POS (L3)  
 Members: 2  
 Total Weighting: 2  
 Sub-interfaces: 0

Member Information:

| Port:      | ID | BW |
|------------|----|----|
| -----      | -- | -- |
| POS0/2/0/1 | 3  | 1  |
| POS0/4/0/0 | 4  | 1  |

RP/0/RSP0/CPU0:router# **show bundle load-balancing Bundle-Ether 12345 detail location 0/0/CPU0**

Bundle-Ether12345

Type: Ether (L2)  
 Members: 63  
 Total Weighting: 134  
 Sub-interfaces: 10

Member Information:

| Port      | ID | BW |
|-----------|----|----|
| -----     | -- | -- |
| Gi0/0/0/1 | 0  | 10 |
| Gi0/0/0/3 | 1  | 1  |

[...]

Sub-interface Information:

| Sub-interface                | Type | Load Balance |
|------------------------------|------|--------------|
| -----                        | ---- | -----        |
| Bundle-Ether12345.4294967295 | L2   | Default      |
| Bundle-Ether12345.2          | L2   | Hash: XID    |
| Bundle-Ether12345.3          | L2   | Fixed: 2     |

[...]

RP/0/RSP0/CPU0:router# **show bundle load-balancing Bundle-Ether12345.2 location 0/0/CPU0**

Bundle-Ether12345

Type: Ether (L2)  
 Members: 63

**show bundle load-balancing**

Total Weighting: 134  
Sub-interfaces: 10

## Sub-interface Information:

| Sub-interface       | Type | Load Balance |
|---------------------|------|--------------|
| Bundle-Ether12345.2 | L2   | Hash: XID    |

## Platform Information:

=====

## Bundle Summary Information:

|                   |                   |              |             |
|-------------------|-------------------|--------------|-------------|
| Interface         | : Bundle-Ether100 | Ifhandle     | : 0xa0000a0 |
| Lag ID            | : 1               | Virtual Port | : 20        |
| Number of Members | : 4               | Local to LC  | : 1         |

## Member Information:

| ul_id | Interface  | ifhandle  | SFP | port | slot |
|-------|------------|-----------|-----|------|------|
| 0     | Gi0/4/0/3  | 0x8000100 | 16  | 3    | 4    |
| 1     | Gi0/4/0/10 | 0x80002c0 | 17  | 10   | 4    |
| 2     | Gi0/4/0/17 | 0x8000480 | 17  | 17   | 4    |
| 3     | Gi0/4/0/24 | 0x8000640 | 18  | 4    | 4    |

## Bundle Table Information:

[NP 0]:

| Unicast (Global) LAG table |       |       |     |      | Multicast (Local) LAG table |       |       |     |      |
|----------------------------|-------|-------|-----|------|-----------------------------|-------|-------|-----|------|
| idx                        | local | ul_id | SFP | port | idx                         | local | ul_id | SFP | port |
| 1                          | 1     | 0     | 16  | 3    | 1                           | 1     | 0     | 16  | 3    |
| 2                          | 1     | 1     | 17  | 10   | 2                           | 1     | 1     | 17  | 10   |
| 3                          | 1     | 2     | 17  | 17   | 3                           | 1     | 2     | 17  | 17   |
| 4                          | 0     | 3     | 18  | 4    | 4                           | 0     | 3     | 18  | 4    |
| 5                          | 1     | 0     | 16  | 3    | 5                           | 1     | 0     | 16  | 3    |
| 6                          | 1     | 1     | 17  | 10   | 6                           | 1     | 1     | 17  | 10   |
| 7                          | 1     | 2     | 17  | 17   | 7                           | 1     | 2     | 17  | 17   |
| 8                          | 0     | 3     | 18  | 4    | 8                           | 0     | 3     | 18  | 4    |

**Related Commands**

| Command                                                        | Description                                                                                                           |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <a href="#">bundle-hash</a> , on page 541                      | Displays the source and destination IP addresses for the member links.                                                |
| <a href="#">bundle load-balancing hash (EFP)</a> , on page 550 | Configures all egress traffic on a particular subinterface of a bundle to flow through the same physical member link. |
| <a href="#">show bundle</a> , on page 589                      | 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/RSP0/CPU0:router# show bundle replication bundle-ether 1 all
```

# show iccp group

To display information for the ICCP parameters, use the **show iccp** command in EXEC mode.

**show iccp group** {*group-id*| **location** *node-id*}

## Syntax Description

|                 |                                                                                          |
|-----------------|------------------------------------------------------------------------------------------|
| <i>group-id</i> | ICCP group ID.                                                                           |
| <b>location</b> | Specifies the location.                                                                  |
| <i>node-id</i>  | Node ID. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation. |

## Command Default

None

## 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 |
|----------|------------|
| mpls-ldp | read       |

## Examples

The following example shows the output of the **show iccp group** command:

```
RP/0/RSP0/CPU0:router#show iccp group

Redundancy Group 1
 member ip:2.2.2.2 (router2), up (connected)
 monitor: route-watch (up)
 backbone interface Gi0/2/0/3: up
 enabled applications: mLACP
 isolation recovery delay timer: 180 s, not running
Redundancy Group 2
 member ip:2.2.2.2 (router2), up (disconnected)
```

```
monitor: route-watch (up)
backbone interface Gi0/2/0/3: up
enabled applications: mLACP
isolation recovery delay timer: 180 s, not running
```

```
RP/0/RSP0/CPU0:router#show iccp group 1
Redundancy Group 1
member ip:2.2.2.2 (router2), up (connected)
monitor: route-watch (up)
backbone interface Gi0/2/0/3: up
enabled applications: mLACP
isolation recovery delay timer: 180 s, not running
```

# 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-id*

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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/RSP0/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.
```

Bundle-Ether1

|            |                |       | Minimum active |            | Maximum active |                           |
|------------|----------------|-------|----------------|------------|----------------|---------------------------|
| B/W (Kbps) | MAC address    |       | Links          | B/W (Kbps) | 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 44: 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.                                                                                                                                                                                                                                                                                                             |
| 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.                                                                                                                      |

| Field     | Description                                                                                                                                           |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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</a> , on page 546   | Adds a port to an aggregated interface or bundle. |
| <a href="#">show bundle</a> , on page 589 | 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-id*

**Command Default** No default behavior or values

**Command Modes** EXEC

| Command History | Release       | Modification                 |
|-----------------|---------------|------------------------------|
|                 | Release 3.7.2 | 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/RSP0/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 |
|-----------|--------|--------|------------|
|           |        |        |            |
| Gi0/0/2/0 | 0      | 0      | 0          |

**Table 45: show lacp counters Field Descriptions**

| Field   | Description                                                                                                                                                                                                                                                                                                                                                                                     |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LACPDUs | <p>Provides the following statistics for Link Aggregation Control Protocol data units (LACPDUs):</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> |

**Related Commands**

| Command                                          | Description                                                                                                    |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <a href="#">clear lacp counters, on page 559</a> | 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-id* {**GigabitEthernet**| **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>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> .                                                                                                                                                            |
| <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/RSP0/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/RSP0/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)
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)

```

## Related Commands

| Command                                               | Description                                                                              |
|-------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">show lacp packet-capture, on page 622</a> | Displays the contents of LACP packets that are sent and received on an interface.        |
| <a href="#">lacp period short, on page 572</a>        | Enables a short period time interval for the transmission and reception of LACP packets. |
| <a href="#">lacp packet-capture, on page 569</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**|**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>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/RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RSP0/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/RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RSP0/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
```

**show lacp packet-capture**

```

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 619</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 572</a>   | Enables a short period time interval for the transmission and reception of LACP packets.                             |
| <a href="#">lacp packet-capture, on page 569</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| TenGigE] *interface\_instance*]

## Command Default

No default behavior or values.

## Command Modes

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 3.7.2 | 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 port information for all link bundles on a router:

```
RP/0/RSP0/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 46: 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>                                                                                                             |
| Flags     | Provides information about the state of the specified 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 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.                                                                                                                                                                                                                                                                                        |
| 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 an 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 546</a>        | Adds a port to an aggregated interface or bundle.               |
| <a href="#">show bundle, on page 589</a>      | Displays information about configured bundles.                  |
| <a href="#">show lacp bundle, on page 614</a> | 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 3.7.2 | 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/RSP0/CPU0:router# show lacp system-id
```

```
Priority MAC Address
----- -
0x8000 08-00-45-3a-65-01
```

**Table 47: 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</a> , <a href="#">on page 546</a>        | Adds a port to an aggregated interface or bundle.               |
| <a href="#">show bundle</a> , <a href="#">on page 589</a>      | Displays information about configured bundles.                  |
| <a href="#">show lacp bundle</a> , <a href="#">on page 614</a> | Displays detailed information about LACP ports and their peers. |
| <a href="#">show lacp port</a> , <a href="#">on page 625</a>   |                                                                 |

# show mlacp

To display the MC-LAG information configured locally and for any connected mLACP peer devices, use the **show mlacp** command in the EXEC mode.

**show mlacp** [**Bundle-Ether** *interface-path-id*] **iccp-group** *group-id*] [**brief**] **verbose**]

## Syntax Description

|                                              |                                                                                          |
|----------------------------------------------|------------------------------------------------------------------------------------------|
| <b>Bundle-Ether</b> <i>interface-path-id</i> | Displays the information for the ICCP group of the bundle and only the specified bundle. |
| <b>iccp-group</b> <i>group-id</i>            | Displays information related to the ICCP group.                                          |
| <b>brief</b>                                 | Displays only the ICCP group information without any bundle information.                 |
| <b>verbose</b>                               | Displays the ICCP group, the bundle and member information.                              |

## 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 |
|---------|------------|
| bundle  | Read       |

## Examples

These examples display the MC-LAG information:

```
RP/0/RSP0/CPU0:router# show mlacp brief
```

```
ICCP Group 1
 Connect timer: Off
```

| Node | LDP ID  | State | System ID                | Sync | Vers |
|------|---------|-------|--------------------------|------|------|
| 1    | 5.4.3.1 | Up    | 0x0001,00-0d-00-0e-00-0f | Done | 1    |
| 2    | Local   | Up    | 0x0001,00-0d-00-0e-00-0f | Done | -    |

RP/0/RP0/CPU0:poa2#show mlacp

ICCP Group 1  
Connect timer: Off

| Node | LDP ID  | State | System ID                | Sync | Vers |
|------|---------|-------|--------------------------|------|------|
| 1    | 5.4.3.1 | Up    | 0x0001,00-0d-00-0e-00-0f | Done | 1    |
| 2    | Local   | Up    | 0x0001,00-0d-00-0e-00-0f | Done | -    |

Bundle-Ether1 (ROID: 0000.0001.0000.0000)

| Node | Aggregator Name | State | Agg ID | MAC Address    |
|------|-----------------|-------|--------|----------------|
| 1    | BE1             | Up    | 0x0001 | 0000.deaf.0000 |
| 2    | Bundle-Ether1   | Up    | 0x0001 | 0000.deaf.0000 |

RP/0/RP0/CPU0:router#show mlacp verbose

ICCP Group 1  
Connect timer: Off

| Node | LDP ID  | State | System ID                | Sync | Vers |
|------|---------|-------|--------------------------|------|------|
| 1    | 5.4.3.1 | Up    | 0x0001,00-0d-00-0e-00-0f | Done | 1    |
| 2    | Local   | Up    | 0x0001,00-0d-00-0e-00-0f | Done | -    |

Bundle-Ether1 (ROID: 0000.0001.0000.0000)

| Node | Aggregator Name | State | Agg ID | MAC Address    |
|------|-----------------|-------|--------|----------------|
| 1    | BE1             | Up    | 0x0001 | 0000.deaf.0000 |
| 2    | Bundle-Ether1   | Up    | 0x0001 | 0000.deaf.0000 |

| Node | Port Name | State | Port   | Priority<br>Oper (Cfgd) |
|------|-----------|-------|--------|-------------------------|
| 1    | Gi0/1/0/3 | Up    | 0x9001 | 0x03e8 (0x03e8)         |
| 2    | Gi0/0/0/1 | Up    | 0xa001 | 0x07d0 (0x07d0)         |

# show mlacp counters

To display counters relating to mLACP information transferred to and from the local device, use the **show mlacp counters** command in the EXEC mode.

**show mlacp counters** [**bdl-info**| **ig-info**| **mbr-info**] [**bundle interface**| **member interface**] [**iccp-group** *group-id*] [**mlacp-device** *device-id*] [**mlacp-interface** *foreign-member-interface*]

## Syntax Description

|                         |                                                                                                                                        |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bundle-Ether</b>     | Displays the requested information associated with the bundle interface.                                                               |
| <b>member interface</b> | Displays the requested information associated with the member interface.                                                               |
| <b>counters</b>         | Displays information on the mLACP counters.                                                                                            |
| <b>bdl-info</b>         | Displays the bundles counters.                                                                                                         |
| <b>ig-info</b>          | Displays the ICCP group counters.                                                                                                      |
| <b>mbr-info</b>         | Displays the member counters.                                                                                                          |
| <b>mlacp-device</b>     | Displays the requested information associated with the mLACP device.                                                                   |
| <b>Note</b>             | The <b>mlacp-device</b> and <b>mlacp-interface</b> keywords are available only when mLACP devices and mLACP interfaces are configured. |
| <b>mlacp-interface</b>  | Displays the requested information associated with the mLACP interface.                                                                |

## 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 |
|---------|------------|
| bundle  | Read       |

## Examples

These examples display MC-LAG counter information:



## Note

The GigabitEthernet 0/0/0/1 is configured to Bundle-Ether 1 which is within ICCP Group1. Hence, the **show mlagp counters bdl-info GigabitEthernet 0/0/0/1** command displays the counters of the bundle that GigabitEthernet 0/0/0/1 is associated with (i.e. Bundle-Ether1). The **show mlagp counters mbr-info Bundle-Ether 1** displays the counters of the members that Bundle-Ether1 is associated with (locally: GigabitEthernet 0/0/0/1, and on the foreign device: GigabitEthernet 0/1/0/3).

```
RP/0/RSP0/CPU0:router# show mlagp counters bdl-info GigabitEthernet 0/0/0/1
```

ICCP Group 1

| Bundle                     | Config | State | TLVs Sent<br>Priority | NAKs | TLVs Received<br>Priority |
|----------------------------|--------|-------|-----------------------|------|---------------------------|
| Local Device               |        |       |                       |      |                           |
| Bundle-Ether1 ???????????? | 3      | 4     | 0                     | 0    | 0                         |
| mLACP Peer 5.4.3.1         |        |       |                       |      |                           |
| Bundle-Ether1 ???????????? | 3      | 4     | 0                     | 0    | 0                         |

| Bundle                     | TLVs | Sync Requests<br>(config) (state) | Last Cleared |
|----------------------------|------|-----------------------------------|--------------|
| Local Device               |      |                                   |              |
| Bundle-Ether1 ???????????? | 0    | 0                                 | 18m12s       |
| mLACP Peer 5.4.3.1         |      |                                   |              |
| Bundle-Ether1 ???????????? | 0    | 0                                 | 17m57s       |

```
RP/0/0/CPU0:router#show mlagp counters mbr-info Bundle-Ether 1
```

Bundle-Ether1 (ICCP Group 1)

| Port                       | Config | State | TLVs Sent<br>Priority | NAKs | TLVs Received<br>Priority |
|----------------------------|--------|-------|-----------------------|------|---------------------------|
| Local Device               |        |       |                       |      |                           |
| Gi0/0/0/1 ???????????????? | 7      | 0     | 0                     | 0    | 0                         |
| mLACP Peer 5.4.3.1         |        |       |                       |      |                           |
| Gi0/1/0/3 ???????????????? | 7      | 5     | 3                     | 0    | 0                         |

| Port                       | TLVs | Sync Requests<br>(config) (state) | Last Cleared |
|----------------------------|------|-----------------------------------|--------------|
| Local Device               |      |                                   |              |
| All ports ???????????????? | 0    | 0                                 | 19m3s        |
| Gi0/0/0/1 ???????????????? | 0    | 0                                 | 19m3s        |
| mLACP Peer 5.4.3.1         |      |                                   |              |
| All ports ???????????????? | 1    | 1                                 | 18m49s       |
| Gi0/1/0/3 ???????????????? | 0    | 0                                 | 18m49s       |

 **show mlacp counters**



# Management Ethernet Interface Commands on the Cisco ASR 9000 Series Router

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This module provides command line interface (CLI) commands for configuring Management Ethernet interfaces on the Cisco ASR 9000 Series Router.

- [duplex \(Management Ethernet\), page 636](#)
- [interface MgmtEth, page 638](#)
- [mac-address \(Management Ethernet\), page 640](#)
- [speed \(Management Ethernet\), page 642](#)

# 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 3.7.2 | 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  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to configure the Management Ethernet interface to operate in full duplex mode:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# duplex half
```

The following example shows how to return a Management Ethernet interface to autonegotiated duplex mode:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# no duplex
```

#### Related Commands

| Command                                         | Description                                                                |
|-------------------------------------------------|----------------------------------------------------------------------------|
| <a href="#">interface MgmtEth</a> , on page 638 | 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 3.7.2 | 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  |
|-----------|-------------|
| interface | read, write |

## Examples

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

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)#
```

**Related Commands**

| Command                                                        | Description                                                          |
|----------------------------------------------------------------|----------------------------------------------------------------------|
| <a href="#">duplex (Management Ethernet), on page 636</a>      | Configures duplex mode operation on a Management Ethernet interface. |
| <a href="#">mac-address (Management Ethernet), on page 640</a> | Sets the MAC layer address of a Management Ethernet interface.       |
| <a href="#">speed (Management Ethernet), on page 642</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 3.7.2 | 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 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/RSP0/CPU0/0:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# mac-address 0001.2468.ABCD
```



**Related Commands**

| Command                                        | Description                                                                |
|------------------------------------------------|----------------------------------------------------------------------------|
| <a href="#">interface MgmtEth, on page 638</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 3.7.2 | 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 48: Relationship Between duplex and speed Commands, on page 642](#) 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 48: 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/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# speed 1000
```

**Related Commands**

| Command                                        | Description                                                                |
|------------------------------------------------|----------------------------------------------------------------------------|
| <a href="#">interface MgmtEth, on page 638</a> | Enters interface configuration mode for the Management Ethernet interface. |





## Multilink Commands on the Cisco ASR 9000 Series Router

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This module provides command line interface (CLI) commands for configuring multilink interfaces on the Cisco ASR 9000 Series Router.

- [bundle](#), page 646
- [controller MgmtMultilink](#), page 648
- [interface multilink](#), page 650
- [multilink](#), page 652
- [multilink fragment](#), page 653
- [multilink group](#), page 655
- [show controllers mgmtmultilink](#), page 657
- [show interfaces multilink](#), page 660

# bundle

To create a multilink interface bundle, use the **bundle** command in the interface configuration mode. To remove a multilink interface bundle, use the **no** form of this command.

**bundle** *bundleID*

## Syntax Description

|                 |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| <i>bundleID</i> | ID number of the multilink interface bundle. The bundle ID can be a 9-digit number. |
|-----------------|-------------------------------------------------------------------------------------|

## 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 **bundle** command is used in mgmtmultilink controller mode to dynamically create a multilink interface. This command is similar to the **channel-group** command on the T1 controller, which dynamically creates a serial interface.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to create a multilink interface with a bundle ID of 1:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# controller mgmtmultilink 0/1/0/0
RP/0/RSP0/CPU0:router(config-mgmtmultilink)# bundle 1
RP/0/RSP0/CPU0:router(config-mgmtmultilink)# commit
```

**Related Commands**

| Command                                      | Description                                                  |
|----------------------------------------------|--------------------------------------------------------------|
| <a href="#">multilink, on page 652</a>       | Enters the config-if-multilink submode.                      |
| <a href="#">multilink group, on page 655</a> | Attaches a serial interface to a multilink interface bundle. |

# controller MgmtMultilink

To configure a controller for a generic multilink bundle and enter MgmtMultilink configuration mode, use the **controller MgmtMultilink** command in global configuration mode. To return to the default state, use the **no** form of this command.

```
controller MgmtMultilink interface-path-id
no controller MgmtMultilink interface-path-id
```

|                    |                                                                                                                                                                                                                                 |                    |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Syntax Description | interface-path-id                                                                                                                                                                                                               | Virtual interface. |
|                    | <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 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.

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

- If specifying a physical interface, the naming notation is *rack/slot/module/instance*. 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.
  - *instance*: Number of the controller instance. The instance is always 0.
- 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 the MgmtMultilink configuration mode :

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller MgmtMultilink 0/1/0/0
RP/0/RSP0/CPU0:router(config-mgmtmultilink)#
```

**Related Commands**

| Command                                                      | Description                                                                               |
|--------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <a href="#">show controllers mgmtmultilink</a> , on page 657 | Displays information about the state and the number of bundles of a multilink controller. |

# interface multilink

To configure a multilink interface and enter multilink interface configuration mode, use the **interface multilink** command in global configuration mode. To delete the interface configuration, use the **no** form of this command. To return to the default state, use the **no** form of this command.

**interface multilink** *interface-path-id* [*.subinterface* {**l2transport** | **point-to-point**}]

**no interface multilink** *interface-path-id* [*.subinterface* {**l2transport** | **point-to-point**}]

## 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.<br><br>For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>l2transport</b>                                | Configures interface to function as one endpoint on a Layer 2 link.                                                                                                                                                                                                                                                                               |
| <b>point-to-point</b>                             | Configures interface to function as one endpoint on a point-to-point link.                                                                                                                                                                                                                                                                        |

## Command Default

No interfaces are configured.

## Command Modes

Global configuration

## Command History

| Release       | Modification                                                                                                    |
|---------------|-----------------------------------------------------------------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                                                                                    |
| Release 4.0.0 | The <i>subinterface</i> argument and the keywords <b>l2transport</b> and <b>point-to-point</b> were introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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 *subinterface* argument and keywords **l2transport** and **po in t-to-point** are only applicable if frame relay encapsulation is enabled using the **encapsulation frame-relay** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to enable frame relay encapsulation for a multilink bundle, and enter subinterface configuration mode.

```
RP/0/RSP0/CPU0:routerRP/0/RSP0/CPU0:router#
RP/0/RSP0/CPU0:router# configure terminal
RP/0/RSP0/CPU0:router(config)# interface multilink 0/3/0/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation frame-relay
RP/0/RSP0/CPU0:router(config-if)# exit
RP/0/RSP0/CPU0:router(config)# interface multilink 0/3/0/0/1.1 point-to-point
RP/0/RSP0/CPU0:router(config-subif)# ipv4 address 10.86.10.48/24
```

The following example shows how to enter interface configuration mode for a multilink bundle with ppp encapsulation. ppp encapsulation is the default encapsulation type:

```
RP/0/RSP0/CPU0:router# configure terminal
RP/0/RSP0/CPU0:router(config)# interface multilink 0/3/0/0/1
RP/0/RSP0/CPU0:router(config-if)#ipv4 address 10.86.10.48/24
```

## Related Commands

| Command                                                                 | Description                                       |
|-------------------------------------------------------------------------|---------------------------------------------------|
| <a href="#">show interfaces multilink</a> , <a href="#">on page 660</a> | Displays information about a multilink interface. |

# multilink

To enter the config-if-multilink submode, use the **multilink** command in the interface configuration mode.

**multilink**

## 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.

For multilink interfaces, the **multilink** command provides access to the config-if-multilink submode to use the **multilink fragment-size** command.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| hdlc    | read, write |

## Examples

The following example shows how to enter the config-if-multilink submode:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1/1:0
RP/0/RSP0/CPU0:router(config-if)# multilink
RP/0/RSP0/CPU0:router(config-if-multilink)# group 1
RP/0/RSP0/CPU0:router(config-if-multilink)# commit
```

## Related Commands

| Command                                       | Description                                                  |
|-----------------------------------------------|--------------------------------------------------------------|
| <a href="#">multilink group</a> , on page 655 | Attaches a serial interface to a multilink interface bundle. |

# multilink fragment

To set the fragmentation size or the fragmentation delay on a multilink interface, use the **multilink fragment** command in interface configuration mode. To remove the fragment size or fragment delay, use the **no** form of this command.

**multilink fragment** {*size size* | *delay delay-ms*}

**no multilink fragment** [*size size* | *delay delay-ms*]

## Syntax Description

|                              |                                                                                                  |
|------------------------------|--------------------------------------------------------------------------------------------------|
| <b>size</b> <i>size</i>      | Specifies the fragment size (in bytes) on a multilink interface. The range is 64 to 9216.        |
| <b>delay</b> <i>delay-ms</i> | Specifies the fragment delay (in milliseconds) on a multilink interface. The range is 1 to 1000. |

## Command Default

No multilink fragment size or fragment delay is set.

## 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.

Multilink fragmentation is only supported for ppp encapsulation, not for frame-relay encapsulation.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| hdlc    | read, write |

## Examples

The following example shows how to set the multilink fragment size:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface multilink 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-if)# multilink fragment size 128
RP/0/RSP0/CPU0:router(config-if)#
```

The following example shows how to set the multilink fragment delay:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface multilink 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-if)# multilink fragment delay 2
RP/0/RSP0/CPU0:router(config-if)#
```

#### Related Commands

| Command                                           | Description                                                                         |
|---------------------------------------------------|-------------------------------------------------------------------------------------|
| <a href="#">interface multilink</a> , on page 650 | Configures a multilink interface and enters multilink interface configuration mode. |

# multilink group

To attach a serial interface to a multilink interface bundle, use the **multilink group** command in interface configuration mode. To remove a serial interface from a multilink interface bundle, use the **no** form of this command.

**multilink group** *bundleID*

**no multilink group** *bundleID*

## Syntax Description

|                 |                                                                                                       |
|-----------------|-------------------------------------------------------------------------------------------------------|
| <i>bundleID</i> | Bundle ID number of the multilink interface, in the format <i>rack/slot/bay/controllerID/bundleID</i> |
|-----------------|-------------------------------------------------------------------------------------------------------|

## 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  |
|---------|-------------|
| hdlc    | read, write |

## Examples

The following examples show how to attach a serial interface to a multilink interface bundle:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1/1/1:0
RP/0/RSP0/CPU0:router(config-if)# multilink group 1
RP/0/RSP0/CPU0:router(config-if)# commit
```

or

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1/1/1:0
```

```
RP/0/RSP0/CPU0:router(config-if)# multilink
RP/0/RSP0/CPU0:router(config-if-multilink)# group 1
(config-if-multilink)# commit
```

**Related Commands**

| Command                                 | Description                             |
|-----------------------------------------|-----------------------------------------|
| <a href="#">multilink</a> , on page 652 | Enters the config-if-multilink submode. |



# show controllers mgmtmultilink

To display information about the state and the number of bundles of a multilink controller, use the **show controller mgmtmultilink** command in EXEC mode.

**show controllers mgmtmultilink** *interface-path-id* [**all**|**brief**|**internal-state**|**tabular**]

## Syntax Description

|                          |                                                                                                                                                                                                                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>interface-path-id</i> | 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 multilink management information.                                                                                                                                                                                                            |
| <b>brief</b>             | Displays brief multilink management information.                                                                                                                                                                                                          |
| <b>internal-state</b>    | Displays internal multilink management state.                                                                                                                                                                                                             |
| <b>tabular</b>           | Displays multilink management information in tabular format.                                                                                                                                                                                              |

## 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.

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

- If specifying a physical interface, the naming notation is *rack/slot/module/instance*. 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.

◦ *instance*: Number of the controller instance. The instance is always 0.

- 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 information for a management multilink controller:

```
RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 all
```

```
Controller MgmtMultilink0/3/0/0
State is up
Number of bundles: 2
 Bundle 1 - Multilink0/3/0/0/1 (0x06186240)
 Type: Full Framed Tls
 Bandwidth: 3072 kbps
 Encapsulation: Frame Relay
 Fragment size: 0
 Number of members: 2
 Ancestor name: SONET0/3/0/0
 Member(s):
 Serial0/3/0/0/1/1:0 (0x0619b640) Active
 Serial0/3/0/0/1/2:0 (0x06176980) Active

 Bundle 2 - Multilink0/3/0/0/2 (0x06176840)
 Type: Full Framed Tls
 Bandwidth: 3072 kbps
 Encapsulation: Frame Relay
 Fragment size: 0
 Number of members: 2
 Ancestor name: SONET0/3/0/0
 Member(s):
 Serial0/3/0/0/1/3:0 (0x0619b3c0) Active
 Serial0/3/0/0/1/4:0 (0x0618b9c0) Active
```

```
RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 brief
```

```
MgmtMultilink0/3/0/0 is up
```

```
RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 tabular
```

```
MgmtMultilink0/3/0/0 is up
```

```
RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 internal-state
```

```
Interface(layer) admin_up if_state

MgmtMultilink0/3/0/0 up up
```

```
RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/2/0/0
```

```
Controller MgmtMultilink0/2/0/0
State is up
Number of bundles: 1
 Bundle 1 - Multilink0/2/0/0/1 (0x0802e400)
 Type: Full Framed Tls
 Bandwidth: 1536 kbps
 Encapsulation: PPP
 Fragment size: 0
```

```
Number of members: 1
Ancestor name: SONET0/2/0/0
Member(s):
 Serial0/2/0/0/1/1:0 (0x08023c00) Active
```

**Related Commands**

| Command                                                 | Description                                       |
|---------------------------------------------------------|---------------------------------------------------|
| <a href="#">show interfaces multilink</a> , on page 660 | Displays information about a multilink interface. |

# show interfaces multilink

To display information about a multilink interface, use the **show interfaces multilink** command in EXEC mode.

**show interfaces multilink** *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 3.9.0 | 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.

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 information about a multilink interface:

```
RP/0/RSP0/CPU0:router# show interfaces multilink 0/1/0/0/1
Multilink0/1/0/0/1 is up, line protocol is up
 Interface state transitions: 1
 Hardware is Multilink network interface(s)
 Internet address is 10.1.1.1/24
 MTU 1504 bytes, BW 1536 Kbit
 reliability 255/255, txload 3/255, rxload 3/255
 Encapsulation PPP, loopback not set, keepalive set (10 sec)
 LCP Open
 Open: IPCP
 Last input 00:00:00, output 00:00:00
 Last clearing of "show interface" counters 02:06:24
 5 minute input rate 19000 bits/sec, 5 packets/sec
 5 minute output rate 19000 bits/sec, 5 packets/sec
 48769 packets input, 12425740 bytes, 0 total input drops
 0 drops for unrecognized upper-level protocol
 Received 0 runts, 0 giants, 0 throttles, 0 parity
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
 67905 packets output, 17400050 bytes, 0 total output drops
 0 output errors, 0 underruns, 0 applique, 0 resets
 0 output buffer failures, 0 output buffers swapped out
 Fragmentation Statistics
 Input Fragmented packets 0 Input Fragmented bytes 0
 Output Fragmented packets 0 Output Fragmented bytes 0
 Input Unfragmented packets 0 Input Unfragmented bytes 0
 Output Unfragmented packets 0 Output Unfragmented bytes 0
 Input Reassembled packets 0 Input Reassembled bytes 0
```

 show interfaces multilink



## Packet-over-SONET Interface Commands on the Cisco ASR 9000 Series Router

---

This module provides command line interface (CLI) commands for configuring Packet-over-SONET/SDH (POS) on the Cisco ASR 9000 Series 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 664](#)
- [encapsulation \(POS\), page 666](#)
- [interface pos, page 668](#)
- [keepalive \(POS\), page 670](#)
- [pos, page 672](#)
- [show interfaces pos, page 674](#)
- [transmit-delay, page 677](#)

## 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 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.

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 this 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 677 | 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**|**frame-relay** [**ietf**] }

**no encapsulation** [**hdlc**|**ppp**|**frame-relay** [**ietf**] ]

### 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 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 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 this example, PPP encapsulation is set on POS interface 0/3/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
```

## Related Commands

| Command                                           | Description                                      |
|---------------------------------------------------|--------------------------------------------------|
| <a href="#">show interfaces pos, on page 674</a>  | Displays information about a POS interface.      |
| <a href="#">show ppp interfaces , on page 727</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] {**l2 transport**| **point-to-point**}]

**no interface pos** *interface-path-id* [.subinterface] {**l2 transport**| **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>l2transport</b>                          | (Optional) Configures the interface to function as an attachment circuit (AC) on one endpoint of a Layer 2 link.                                                                                                                                                                                                                                  |
| <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 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.

Subinterfaces of a POS interface can only be configured using the **l2transport** keyword, if Frame Relay encapsulation is configured on the POS interface, using the **encapsulation frame-relay** command. Interfaces configured to use HDLC or PPP encapsulation cannot be configured using the **l2transport** keyword.

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.

- *f* 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/RSP0/CPU0:router(config)# interface pos 0/1/0/0
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface pos 0/1/1/2.1
RP/0/RSP0/CPU0:router(config-subif)#
```

The following example shows how to configure frame-relay encapsulation on the main POS interface before being able to configure an AC subinterface:

```
RP/0/RSP0/CPU0:router# interface pos 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# encapsulation frame-relay
RP/0/RSP0/CPU0:router(config-if)# commit
RP/0/RSP0/CPU0:router(config-if)# exit
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/0.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# commit
```

**Related Commands**

| Command                                           | Description                                 |
|---------------------------------------------------|---------------------------------------------|
| <a href="#">show interfaces pos</a> , on page 674 | 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 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.

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**

This example shows how to configure keepalives for 3 seconds on POS interface 0/7/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/7/0/1
RP/0/RSP0/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 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 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/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# POS
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# POS
RP/0/RSP0/CPU0:router(config-if-pos)#
```

## Related Commands

| Command                                     | Description                                                              |
|---------------------------------------------|--------------------------------------------------------------------------|
| <a href="#">crc (POS), on page 664</a>      | Sets the length of the CRC on a Packet-over-SONET/SDH (POS) interface.   |
| <a href="#">transmit-delay, on page 677</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 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 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/RSP0/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 49: 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/RSP0/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 50: 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 882</a>   | Displays information on the POS controllers.                       |
| <a href="#">show controllers sonet, on page 888</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*

|                           |                     |                                                                                                                   |
|---------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>microseconds</i> | Number of microseconds of minimum delay after sending a packet. Range is from 0 to 1023. Default is 0 (disabled). |
|---------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------|

|                        |                                    |
|------------------------|------------------------------------|
| <b>Command Default</b> | <i>microseconds</i> = 0 (disabled) |
|------------------------|------------------------------------|

|                      |                   |
|----------------------|-------------------|
| <b>Command Modes</b> | POS configuration |
|----------------------|-------------------|

|                        |                 |                              |
|------------------------|-----------------|------------------------------|
| <b>Command History</b> | <b>Releases</b> | <b>Modifications</b>         |
|                        | Release 4.0.0   | 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> |
|                | pos-dpt        | read, write       |

|                 |                                                                                            |
|-----------------|--------------------------------------------------------------------------------------------|
| <b>Examples</b> | In the following example, a delay of 2 microseconds is specified on POS interface 0/1/0/2: |
|-----------------|--------------------------------------------------------------------------------------------|

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# pos
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# no transmit-delay
```

transmit-delay

RP/0/RSP0/CPU0:router(config-if-pos)# no transmit-delay

Related Commands

| Command         | Description |
|-----------------|-------------|
| show interfaces |             |



# PPP Commands on the Cisco ASR 9000 Series Router

---

This module provides command line interface (CLI) commands for configuring Point-to-Point Protocol (PPP) on the Cisco ASR 9000 Series Router.

Point-to-Point Protocol (PPP) is an encapsulation scheme that can be used on Packet-over-SONET (POS), serial, and multilink 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 681](#)
  - [clear ppp statistics, page 683](#)
  - [encapsulation ppp, page 684](#)
  - [group, page 686](#)
  - [multi-router aps, page 688](#)
  - [peer ipv4 address, page 689](#)
  - [ppp authentication, page 690](#)
  - [ppp chap password, page 693](#)
  - [ppp chap refuse, page 695](#)
  - [ppp ipcp dns, page 697](#)
  - [ppp ipcp neighbor-route disable, page 698](#)

- [ppp ipcp peer-address default, page 699](#)
- [ppp max-bad-auth , page 700](#)
- [ppp max-configure , page 702](#)
- [ppp max-failure , page 704](#)
- [ppp max-terminate, page 706](#)
- [ppp ms-chap hostname, page 708](#)
- [ppp ms-chap password, page 709](#)
- [ppp ms-chap refuse, page 711](#)
- [ppp multilink multiclass, page 713](#)
- [ppp multilink multiclass local, page 714](#)
- [ppp multilink multiclass remote apply, page 716](#)
- [ppp pap refuse, page 718](#)
- [ppp pap sent-username password, page 720](#)
- [ppp timeout authentication, page 722](#)
- [ppp timeout retry, page 724](#)
- [redundancy, page 725](#)
- [security ttl, page 726](#)
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- [show ppp sso alerts, page 735](#)
- [show ppp sso state, page 737](#)
- [show ppp sso summary, page 739](#)
- [ssrp group, page 741](#)
- [ssrp location, page 743](#)
- [ssrp profile, page 744](#)



# 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/RSP0/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/RSP0/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/RSP0/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

| 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 **encapsulation ppp** command to enable PPP encapsulation on an interface.

| 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
```

The following example shows how to set up PPP encapsulation on a serial interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router# interface serial 0/0/1/2/4:3
```

```
RP/0/RSP0/CPU0:router# encapsulation ppp
```

**Related Commands**

| Command                                                           | Description                                      |
|-------------------------------------------------------------------|--------------------------------------------------|
| <a href="#">show ppp interfaces</a> , <a href="#">on page 727</a> | 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# ssrp location 0/1/cpu0
RP/0/RSP0/CPU0:router(config-ssrp-node)# group 1 profile default
```

**Related Commands**

| Command                                    | Description                                                                                  |
|--------------------------------------------|----------------------------------------------------------------------------------------------|
| <a href="#">ssrp location, on page 743</a> | 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# redundancy
RP/0/RSP0/CPU0:router(config-redundancy)# multi-router aps
RP/0/RSP0/CPU0:router(config-redundancy-aps)
```

| Related Commands | Command                                  | Description                                                   |
|------------------|------------------------------------------|---------------------------------------------------------------|
|                  | <a href="#">redundancy</a> , on page 725 | 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/RSP0/CPU0:router# config RP/0/RSP0/CPU0:router(config)# ssrp profile Profile_1 RP/0/RSP0/CPU0:router(config-ssrp)# peer ipv4 address 10.10.10.10</pre> |  |         |              |                                           |                                                                   |
| Related Commands                          | <table><tr><th>Command</th><th>Description</th></tr><tr><td><a href="#">ssrp profile, on page 744</a></td><td>Configures a SSRP profile and enters the SSRP configuration mode.</td></tr></table>                                                                                          |  | Command | Description  | <a href="#">ssrp profile, on page 744</a> | Configures a SSRP profile and enters the SSRP configuration mode. |
| Command                                   | Description                                                                                                                                                                                                                                                                                |  |         |              |                                           |                                                                   |
| <a href="#">ssrp profile, on page 744</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 appropriate 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 51: PPP Authentication Protocols for Negotiation, on page 691</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 3.9.0 | This command was introduced.                                                   |
| Release 4.2.0 | This command was supported in the dynamic template configuration mode for BNG. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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 51: PPP Authentication Protocols for Negotiation, on page 691](#) lists the protocols used to negotiate PPP authentication.

**Table 51: 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 this example, CHAP is enabled on POS 0/4/0/1 and uses the authentication list MIS-access:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/4/0/1
```

```
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp authentication chap MIS-access
```

**Related Commands**

| Command                       | Description                                                                                         |
|-------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>aaa authentication ppp</b> | Specifies one or more AAA authentication methods for use on serial interfaces running PPP.          |
| <b>encapsulation</b>          | Sets the encapsulation method used by the interface.                                                |
| <b>username</b>               | 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 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 **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/RSP0/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/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 1/0/1/0
RP/0/RSP0/CPU0:router(config-if)# ppp chap password xxxx
RP/0/RSP0/CPU0:router(config-if)# ppp chap password clear xxxx
RP/0/RSP0/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</a> , on page 690 | 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</a> , on page 695    | Refuses CHAP authentication from peers requesting it.                                                                                                         |
| <a href="#">ppp max-bad-auth</a> , on page 700   | 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 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 **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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
```

```
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/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</a> , on page 690             | 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 700               | 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 720 | 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/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

|                |                                                                                                              |
|----------------|--------------------------------------------------------------------------------------------------------------|
| <i>retries</i> | 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

### Command History

| Release       | Modification                                                                   |
|---------------|--------------------------------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                                                   |
| Release 4.2.0 | This command was supported in the dynamic template configuration mode for BNG. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task 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.

### 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/RSP0/CPU0:router# configure
```

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp authentication chap
RP/0/RSP0/CPU0:router(config-if)# ppp max-bad-auth 3
```

## 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 an appropriate 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

|                |                                                                  |
|----------------|------------------------------------------------------------------|
| <i>retries</i> | Maximum number of retries. Range is 4 through 20. Default is 10. |
|----------------|------------------------------------------------------------------|

### Command Default

*retries*: 10

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                                   |
|---------------|--------------------------------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                                                   |
| Release 4.2.0 | This command was supported in the dynamic template configuration mode for BNG. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task 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.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |
| aaa     | read, write |

## Examples

This example shows a limit of four configure requests:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp max-configure 4
```

## Related Commands

| Command                                                       | Description                                                                                       |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <a href="#">ppp max-failure</a> , <a href="#">on page 704</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 an 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 | <i>retries: 5</i> |
|-----------------|-------------------|
|-----------------|-------------------|

| Command Modes | Interface configuration |
|---------------|-------------------------|
|---------------|-------------------------|

| Command History | Release       | Modification                                                                   |
|-----------------|---------------|--------------------------------------------------------------------------------|
|                 | Release 3.9.0 | This command was introduced.                                                   |
|                 | Release 4.2.0 | This command was supported in the dynamic template configuration mode for BNG. |

| Usage Guidelines | To use this command, you must be in a user group associated with a task 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 <b>ppp max-failure</b> command specifies that no more than three CONFNAKs are permitted before terminating the negotiation: |
|----------|---------------------------------------------------------------------------------------------------------------------------------|
|----------|---------------------------------------------------------------------------------------------------------------------------------|

```
RP/0/RSP0/CPU0:router# configure
```



```
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp max-failure 3
```

**Related Commands**

| Command                                                         | Description                                                                                                    |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <a href="#">ppp max-configure</a> , <a href="#">on page 702</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**

### Command Default

*number*: 2

### 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

In the following example, a maximum of five TermReqs are specified to be sent before terminating and closing LCP or NCP:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/CPU0:router(config-if)# ppp max-terminate 5
```

### Related Commands

| Command                                                         | Description                                                                                                    |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <a href="#">ppp max-configure</a> , <a href="#">on page 702</a> | Specifies the maximum number of configure requests to attempt (without response) before stopping the requests. |

| Command                                       | Description                                                                                       |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------|
| <a href="#">ppp max-failure , on page 704</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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/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 3.9.0 | 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 **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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/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**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no keywords or arguments. |
|---------------------------|--------------------------------------------|

|                        |                                     |
|------------------------|-------------------------------------|
| <b>Command Default</b> | MS-CHAP authentication is disabled. |
|------------------------|-------------------------------------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | Interface configuration |
|----------------------|-------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | Release 3.9.0  | 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> |
|----------------|----------------|-------------------|
|                | ppp            | read, write       |

|                 |                                                                                                                                                                                                                      |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | This 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. |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Related Commands**

| Command                                                          | Description                                                                                                                         |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">ppp authentication</a> , <a href="#">on page 690</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

| 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 enable multiclass multilink PPP:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RSP0/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

| 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 maximum number of receive classes configures the number of transmission classes on the local host.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
```

```
RP/0/RSP0/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 | <i>min-number</i> | 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 | To use this command, you must be in a user group associated with a task 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 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.

| 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-if)# ppp multilink multiclass remote apply 16
```

**Related Commands**

| Command                                                      | Description                                                                  |
|--------------------------------------------------------------|------------------------------------------------------------------------------|
| <a href="#">ppp ipcp dns, on page 697</a>                    | Configures the primary and secondary DNS IP addresses for the IPCP.          |
| <a href="#">ppp ipcp neighbor-route disable, on page 698</a> | Disables installation of a route to the peer address negotiated by IPCP.     |
| <a href="#">ppp ipcp peer-address default, on page 699</a>   | Specifies the default IPv4 address that is assigned to the peer by the IPCP. |
| <a href="#">ppp ms-chap hostname, on page 708</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

| 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 **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 | 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
```

```
RP/0/RSP0/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 690             | 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 700               | 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 720 | 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 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 **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/RSP0/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/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ppp pap sent-username xxxx password notified
RP/0/RSP0/CPU0:router(config-if)# ppp pap sent-username xxxx password clear notified
RP/0/RSP0/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 690         | 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 713   | Refuses PAP authentication from peers requesting it                                                                                        |
| <a href="#">ppp timeout authentication</a> , on page 722 | 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 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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/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 690 | 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</i> : 3 |
|-----------------|--------------------|
|-----------------|--------------------|

| 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>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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# redundancy
RP/0/RSP0/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*

| <b>Syntax Description</b>     | <table><tr><td><b>max-hops</b> <i>number</i></td><td>Maximum number of hops between the peer routers.</td></tr></table>                                                                                                                                                                                                                         |  | <b>max-hops</b> <i>number</i> | Maximum number of hops between the peer routers. |               |                              |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------|--------------------------------------------------|---------------|------------------------------|
| <b>max-hops</b> <i>number</i> | Maximum number of hops between the peer routers.                                                                                                                                                                                                                                                                                                |  |                               |                                                  |               |                              |
| <b>Command Default</b>        | The <b>max-hops</b> default is 255.                                                                                                                                                                                                                                                                                                             |  |                               |                                                  |               |                              |
| <b>Command Modes</b>          | SSRP configuration                                                                                                                                                                                                                                                                                                                              |  |                               |                                                  |               |                              |
| <b>Command History</b>        | <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.                                                                                                                                                                                                                                                                                                                    |  |                               |                                                  |               |                              |
| <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>If <b>max-hops</b> is not specified, the TTL value must be 255 for a packet to be accepted.</p> |  |                               |                                                  |               |                              |
| <b>Task ID</b>                | <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** 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# ssrp profile Profile_1
RP/0/RSP0/CPU0:router(config-ssrp)# peer ipv4 address 10.10.10.10
RP/0/RSP0/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.<br>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 3.9.0 | This command was introduced.                                                   |
| Release 4.2.0 | This command was supported in the dynamic template configuration mode for BNG. |

**Usage Guidelines**

To use this command, you must be in a user group associated with a task 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**

This example shows how to display PPP state information for a POS interface:

```
RP/0/RSP0/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

```

This 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

```

This example shows how to display PPP state information for a multilink interface:

```
RP/0/RSP0/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

```

This example shows how to display PPP state information for a serial interface:

```
RP/0/RSP0/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 52: 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| 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/RSP0/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/RSP0/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<br>auth | of-peer<br>auth | IPCP      |
| 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<br>auth | of-peer<br>auth | IPCP     |
| 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/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
```

**ssrp group**

```
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# ssrp location 0/1/cpu0
RP/0/RSP0/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

|                     |                            |
|---------------------|----------------------------|
| <i>profile-name</i> | Name of this SSRP 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.

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.

### Task ID

| Task ID | Operations  |
|---------|-------------|
| ppp     | read, write |

### Examples

The following example shows how to configure an SSRP profile:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# ssrp profile Profile_1
RP/0/RSP0/CPU0:router(config-ssrp)#
```





# Satellite nV System Commands on the Cisco ASR 9000 Series Router

---

This module describes the commands used to configure the Satellite nV system on the Cisco ASR 9000 Series Router.

- [hw-module satellite reload, page 746](#)
- [install nv satellite, page 747](#)
- [nv, page 749](#)
- [satellite, page 750](#)
- [satellite-fabric-link satellite, page 751](#)
- [satellite type, page 753](#)
- [serial-number, page 754](#)
- [show nv satellite protocol control, page 755](#)
- [show nv satellite protocol discovery, page 756](#)

# hw-module satellite reload

To reload and perform a soft reset of individual slots of the satellite device, use the **hw-module satellite reload** command in the EXEC mode.

**hw-module satellite** *{satellite id|all}* **reload**

## Syntax Description

|                     |                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------|
| <i>satellite id</i> | Specifies the unique identifier of the satellite device on which reload has to be performed. |
| <i>all</i>          | Performs the reload operation on all the currently active satellites.                        |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.2.1 | 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           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example shows a sample output of the **hw-module satellite reload** command:

```
RP/0/RSP0/CPU0:router # hw-module satellite 101 reload
```

```
Reload operation completed successfully.
```

```
RP/0/RSP0/CPU0:May 3 20:26:51.883 : invmgr[254]: %PLATFORM-INV-6-OIROUT : OIR: Node 101 removed
```

# install nv satellite

To download and activate the software image on the satellite, use the **install nv satellite** command in the EXEC mode.

**install nv satellite** {*satellite id*|*all*} {**transfer**|**activate**}

## Syntax Description

|                     |                                                                                                       |
|---------------------|-------------------------------------------------------------------------------------------------------|
| <i>satellite id</i> | Specifies the unique identifier of the satellite on which the image must be transferred.              |
| <i>all</i>          | Performs the operation on all currently active satellites that are not already at the target version. |
| <b>transfer</b>     | Downloads the image from the host to the satellite device.                                            |
| <b>activate</b>     | Performs the install operation on the satellite.                                                      |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.2.1 | 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

This command only works on satellites that are fully connected and authenticated.



### Note

If the **activate** keyword is run directly, then the software image is transferred to the satellite and also activated.

**Task ID**

| Task ID           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

**Examples**

This example shows the sample output of the **install nv satellite transfer** and **install nv satellite activate** commands:

```
RP/0/RSP0/CPU0:router # install nv satellite 100 transfer
```

```
Install operation initiated successfully.
```

```
RP/0/RSP0/CPU0:sat-host#RP/0/RSP0/CPU0:May 3 20:12:46.732 : icpe_gco[1146]:
%PKT_INFRA-ICPE_GCO-6-TRANSFER_DONE : Image transfer completed on Satellite 100
```

```
RP/0/RSP0/CPU0:router# install nv satellite 100 activate
```

```
Install operation initiated successfully.
```

```
LC/0/2/CPU0:May 3 20:13:50.363 : ifmgr[201]: %PKT_INFRA-LINK-3-UPDOWN : Interface
GigabitEthernet100/0/0/28, changed state to Down
```

```
RP/0/RSP0/CPU0:May 3 20:13:50.811 : invmgr[254]: %PLATFORM-INV-6-OIROUT : OIR: Node 100
removed
```

## nv

To enter the satellite network virtualization configuration mode, use the **nv** command in global configuration mode.

**nv**

**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 4.2.1 | 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           | Operation   |
|---------|-------------------|-------------|
|         | ethernet-services | read, write |

**Examples** This example shows how to enter the **nv** configuration mode:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config) # nv
RP/0/RSP0/CPU0:router(config-nv) #
```

# satellite

To declare a new satellite that is to be attached to the host and enter the satellite configuration mode, use the **satellite** command in the Satellite nV configuration mode.

**satellite** *id*

## Syntax Description

|           |                                                         |
|-----------|---------------------------------------------------------|
| <i>id</i> | The <i>id</i> is a number in the range of 100 to 65534. |
|-----------|---------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Satellite Network Virtualization Configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.2.1 | 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.

Each satellite must be declared in a separate line with an unique identifier.

## Task ID

| Task ID           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example shows how to declare a new satellite device using the **satellite** command:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# nv
RP/0/RSP0/CPU0:router(config-nv)# satellite 1250
```

# satellite-fabric-link satellite

To specify an interface as a ICPE inter-chassis link, use the **satellite-fabric-link satellite** command in the satellite nV interface configuration mode.

**satellite-fabric-link satellite** *id* {**slot** | *slot* | **ports** | *ports*}

## Syntax Description

|                            |                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>satellite</b> <i>id</i> | Specifies the satellite id. It is a number in the range 0-65536.                                                                                                                                                                                                                                                                                         |
| <b>slot</b> <i>slot id</i> | (Optional) Specifies the slot number. The slot ID consists of two slash-separated numbers, representing the slot and sub-slot IDs on the satellite device of the node from which to cross-link ports. This is not supported on single-node satellites.                                                                                                   |
| <b>ports</b> <i>ports</i>  | Specifies the port number. The ports are specified as a range, not necessarily consecutive, of port IDs to crosslink to this IC Link. The range consists of one or more comma-separated sub-ranges. Each sub-range can either be a single number, or a hyphen separated consecutive range (where the left number must be smaller than the right number). |

## Command Default

The slot defaults to 0/0. The ports default to all available ports.

## Command Modes

Satellite Network Virtualization Interface Configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.2.1 | 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           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example shows how to execute the **satellite-fabric-link satellite** command:

```
RP/0/RSP0/CPU0:router # configure
```

```
RP/0/RSP0/CPU0:router(config)# interface TenGigE0/2/1/0
RP/0/RSP0/CPU0:router(config-int)# ipv4 point-to-point
RP/0/RSP0/CPU0:router(config-int)# interface unnumbered loopback0
RP/0/RSP0/CPU0:router(config-int)# nV
RP/0/RSP0/CPU0:router(config-int-nV)# satellite-fabric-link satellite 200
```



# satellite type

To define the expected type of the attached satellite device, use the **satellite type** command in the satellite nV configuration mode.

**satellite id***type**type name*

## Syntax Description

|                              |                                                                                                             |
|------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>type</b> <i>type name</i> | Specifies the type name of the attached satellite. The satellite types are ASR9000v, ASR901v, and ASR 903v. |
|------------------------------|-------------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Satellite Network Virtualization Configuration

## Command History

| Release       | Modification                                                            |
|---------------|-------------------------------------------------------------------------|
| Release 4.2.1 | This command was introduced.                                            |
| Release 4.3.0 | The Cisco ASR901 and ASR903 Series Routers were included as satellites. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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 type string is used to lookup satellite capabilities, allowing other configuration to be verified accurately. The string is user-visible, and must match the publicly known names of the Satellite devices.

## Task ID

| Task ID           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example shows a sample output of how to use the **satellite type** command:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# nv
RP/0/RSP0/CPU0:router(config-nv)# satellite 200
RP/0/RSP0/CPU0:router(config-nv)# satellite 200 type asr9000v
```

# serial-number

To authenticate the serial number for a defined satellite, use the **serial-number** command in the Satellite nV configuration mode.

**serial-number** *string*

## Syntax Description

|               |                                                                    |
|---------------|--------------------------------------------------------------------|
| <i>string</i> | Specifies the alphanumeric string that is assigned to a satellite. |
|---------------|--------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Satellite Network Virtualization Configuration

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.2.1 | 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           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example shows how to specify the serial number for a satellite:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# nv
RP/0/RSP0/CPU0:router(config-nv)# satellite 1250
RP/0/RSP0/CPU0:router(config-nv)# serial-number CAT1521B1BB
```

# show nv satellite protocol control

To display the control protocol statistics and details of the SDAC (Satellite Discovery And Control) protocol, use the **show nv satellite protocol control** in the EXEC mode.

**show nv satellite protocol control** [**brief**] **satellite**

## Syntax Description

|                  |                                                                                    |
|------------------|------------------------------------------------------------------------------------|
| <b>brief</b>     | Displays a brief information of the control protocol statistics.                   |
| <b>satellite</b> | Displays the control protocol information based on the specified satellite device. |

## Command Default

No default behavior or values.

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.2.1 | This command was introduced. |

## Usage Guidelines

### Task ID

| Task ID           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example shows how to run the **show nv satellite protocol control** command:

```
RP/0/RSP0/CPU0:router show nv satellite protocol control brief
```

## Related Commands

| Command                                                            | Description                                              |
|--------------------------------------------------------------------|----------------------------------------------------------|
| <a href="#">show nv satellite protocol discovery</a> , on page 756 | Displays the statistics of satellite discovery protocol. |

# show nv satellite protocol discovery

To display the current FSM states and discovery protocol statistics such as packets, messages, and bytes from the SDAC (Satellite Discovery And Control) protocol, use the **show nv satellite protocol discovery** in the EXEC mode.

**show nv satellite protocol discovery** [**interface** *interface-name*] **brief**

## Syntax Description

|                                        |                                                                          |
|----------------------------------------|--------------------------------------------------------------------------|
| <b>interface</b> <i>interface-name</i> | Displays the discovery protocol information based on the interface type. |
| <b>brief</b>                           | Displays a brief discovery protocol information.                         |

## Command Default

No default behavior or values.

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.2.1 | 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           | Operation   |
|-------------------|-------------|
| ethernet-services | read, write |

## Examples

This example show how to execute the **show nv satellite protocol discovery** command:

```
RP/0/RSP0/CPU0:router show nv satellite protocol discovery brief
```



# Serial Interface Commands on the Cisco ASR 9000 Series Router

---

This module provides CLI commands for configuring serial interfaces on the Cisco ASR 9000 Series Router.

- [clear iphc ipv4](#), page 759
- [crc \(serial\)](#), page 761
- [description \(IPHC profile\)](#), page 763
- [encapsulation \(serial\)](#), page 764
- [feedback disable](#), page 766
- [fragment end-to-end](#), page 767
- [interface serial](#), page 769
- [invert](#), page 772
- [iphc profile](#), page 773
- [ipv4 iphc profile](#), page 775
- [keepalive \(serial\)](#), page 777
- [max-header](#), page 779
- [non-tcp compression](#), page 780
- [non-tcp context absolute](#), page 781
- [refresh max-period](#), page 783
- [refresh max-time](#), page 785
- [refresh rtp](#), page 787
- [rtp](#), page 788
- [scramble](#), page 789
- [serial](#), page 791
- [show iphc idb](#), page 792

- [show iphc ipv4 rtp, page 794](#)
- [show iphc ipv4 tcp, page 796](#)
- [show iphc platform trace, page 798](#)
- [show iphc profile, page 800](#)
- [show iphc trace all, page 803](#)
- [show tech-support iphc, page 805](#)
- [tcp compression, page 808](#)
- [tcp context absolute, page 810](#)
- [transmit-delay \(serial\), page 812](#)

# clear iphc ipv4

To clear all Real Time Protocol (RTP) and Transport Control Protocol (TCP) statistics for IP header compression (IPHC) packets sent and received on an interface, use the **clear iphc ipv4** command in EXEC mode.

**clear iphc ipv4** {**interface** {**serial**| **multilink**} *interface-path-id*| **location** *node-id*}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface</b>         | Specifies the interface to be configured, by type and the <i>interface-path-id</i> argument.                                                                                                                                                                                    |
| <b>serial</b>            | Specifies a serial network interface.                                                                                                                                                                                                                                           |
| <b>multilink</b>         | Specifies a multilink network 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. |
| <b>location</b>          | Specifies the interface to be configured by its <i>node-id</i> .                                                                                                                                                                                                                |
| <i>node-id</i>           | Fully qualified path of the node in the <i>rack/slot/module notation</i> .                                                                                                                                                                                                      |

## 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.



### Note

The **clear counters** command also clears the IPHC statistics for all the interfaces.

**Task ID**

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

**Examples**

The following example shows how to clear RTP and TCP statistics on an interface:

```
RP/0/RSP0/CPU0:router# clear iphc ipv4 interface Serial 0/1/0/1/26:0
Thu Jan 8 20:30:38.155 UTC
```

The following example shows how to clear RTP and TCP statistics on a node:

```
RP/0/RSP0/CPU0:router# clear iphc ipv4 location 0/3/CPU0
Mon Oct 12 22:47:51.430 DST
```



## **crc (serial)**

To set the length of the cyclic redundancy check (CRC) on a serial interface, use the **crc** command in serial configuration mode. To return the CRC setting on a serial interface to the 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. |

### **Command Default**

The default is 16 bits for serial interfaces.

### **Command Modes**

Serial 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.

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**

| <b>Task ID</b> | <b>Operations</b> |
|----------------|-------------------|
| hdlc           | read, write       |

## Examples

In the following example, the 32-bit CRC on serial interface 0/3/0/0:10 is enabled:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0:10
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# crc 32
```

## Related Commands

| Command                                      | Description                                                                             |
|----------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show interfaces, on page 490</a> | Displays statistics for all interfaces configured on the router or for a specific node. |

## description (IPHC profile)

To add a description to an IPHC profile, use the **description** command in IPHC profile configuration mode. To remove a description for an IPHC profile, use the **no** form of this command.

**description** *description*

**no description**

### Syntax Description

|                    |                                              |
|--------------------|----------------------------------------------|
| <i>description</i> | Description to be added to the IPHC profile. |
|--------------------|----------------------------------------------|

### Command Default

By default, no description is attached to an IPHC profile.

### Command Modes

IPHC profile 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.

### Task ID

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

### Examples

In the following example, a description is attached to the IPHC profile test:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile test type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# description testprofile
RP/0/RSP0/CPU0:router(config-iphc-profile)# commit
```

# encapsulation (serial)

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| frame-relay| mfr}

**no encapsulation**

## Syntax Description

|                     |                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>hdlc</b>         | Enables Cisco High-Level Data Link Control (HDLC) encapsulation on the interface. This is the default encapsulation type. |
| <b>ppp</b>          | Enables PPP encapsulation on the interface.                                                                               |
| <b>frame -relay</b> | Enables Frame Relay encapsulation on the interface.                                                                       |
| <b>mfr</b>          | Enables multilink Frame Relay encapsulation on the interface.                                                             |

## Command Default

For serial interfaces, the default encapsulation is HDLC.

## Command Modes

Interface configuration

## Command History

| Release       | Modification                                                        |
|---------------|---------------------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                                        |
| Release 4.0.0 | Frame Relay and Multilink Frame Relay encapsulation was introduced. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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  |
|-----------|-------------|
| hdlc      | read, write |
| interface | read, write |

## Examples

The following example shows how to enable PPP encapsulation on serial interface 0/3/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
```

## Related Commands

| Command                                           | Description                                                                             |
|---------------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show interfaces, on page 490</a>      | Displays statistics for all interfaces configured on the router or for a specific node. |
| <a href="#">show ppp interfaces , on page 727</a> | Displays PPP state information for an interface.                                        |

# feedback disable

To disable the IP header compression (IPHC) context status feedback messages on an interface, use the **feedback disable** command in IPHC profile configuration mode. To re-enable feedback messages after they are disabled, use the **no** form of this command.

**feedback disable**

**no feedback disable**

**Syntax Description** This command has no keywords or arguments.

**Command Default** Feedback messages are enabled by default.

**Command Modes** IPHC profile configuration

| 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**

Feedback disable can be configured only within an IPHC profile.

| Task ID | Task ID     | Operations  |
|---------|-------------|-------------|
|         | ip-services | read, write |

**Examples** The following example shows how to disable the IP header compression (IPHC) context status feedback messages within an IPHC profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# feedback disable
```

# fragment end-to-end

To enable fragmentation of Frame Relay frames on an interface, use the **fragment end-to-end** command in serial Frame Relay PVC configuration mode. To disable Frame Relay fragmentation, use the **no** form of this command.

**fragment end-to-end** *fragment-size*

**no fragment end-to-end**

## Syntax Description

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>fragment-size</i> | Number of payload bytes from the original Frame Relay frame that go into each fragment. This number excludes the Frame Relay header of the original frame.<br><br>All the fragments of a Frame Relay frame, except the last, have a payload size equal to <i>fragment-size</i> ; the last fragment has a payload less than or equal to <i>fragment-size</i> . Valid values are from 64 to 512 bytes, depending on your hardware. |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

Fragmentation is disabled by default.

## Command Modes

Frame Relay virtual circuit 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.

## Task ID

| Task ID | Operations  |
|---------|-------------|
| fr      | read, write |

## Examples

The following example shows how to enter serial Frame Relay virtual circuit configuration mode, set the fragmentation size of Frame Relay frames on subinterface 0/6/2/4.1 to 512 bytes:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/6/2/4.1 point-to-point
RP/0/RSP0/CPU0:router(config-subif)# pvc 100
RP/0/RSP0/CPU0:router(config-fr-vc)# fragment end-to-end 512
```

**Related Commands**

| Command                                                        | Description                                                                                                      |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <a href="#">interface serial</a> , <a href="#">on page 769</a> | Configures a serial interface and enters interface or subinterface configuration mode.                           |
| <a href="#">pvc (serial)</a>                                   | Creates a Frame Relay PVC under a serial subinterface and enters Frame Relay virtual circuit configuration mode. |



# interface serial

To configure a serial interface and enter interface or subinterface configuration mode, use the **interface serial** command in global configuration mode. To delete a serial configuration, use the **no** form of this command.

**interface serial** *interface-path-id* [. *subinterface*] {**point-to-point**| **l2transport**}

**no interface serial** *interface-path-id* [. *subinterface*] {**point-to-point**| **l2transport**}

## Syntax Description

*interface-path-id*[.*subinterface*] Physical interface or virtual interface followed by the optional subinterface path ID. Naming notation is *interface-path-id.subinterface*. 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 default behavior or values

## Command Modes

Global configuration

## Command History

| Release       | Modification                                                                                                  |
|---------------|---------------------------------------------------------------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                                                                                  |
| Release 4.0.0 | The . <i>subinterface</i> argument, and the <b>point-to-point</b> and <b>l2transport</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.

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



### Note

A slash between values is required as part of the notation.

- The naming notation for T1 interfaces on a channelized SPA is *rack/slot/module/port/channel-num:channel-group-number*, as shown in the following example:

```
interface serial 0/0/1/2/4:3
```

- If a subinterface is configured under the serial interface, then the router includes the subinterface number at the end of the serial interface address. In this case, the naming notation is *rack/slot/module/port[/channel-num:channel-group-number].subinterface*, as shown in the following example:

```
interface serial 0/0/1/2.1
```

- The naming notation syntax for serial interfaces is as follows:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the modular services card or line card.
  - *module*—Module number. Shared port adapters (SPAs) are referenced by their subslot number.
  - *port*—Physical port number of the controller.
  - *channel-num*:—T1 channel number. T1 channels range from 0 to 23.
  - *channel-group-number*:—Time slot number. T1 time slots range from 1 to 24. The *channel-group-number* is preceded by a colon and not a slash.
  - *subinterface*—Subinterface number.
- Use the question mark (?) online help function following the **serial** keyword to view a list of all valid interface choices.

Serial interfaces on channelized T3 can be deleted using the **no channel-group** command in T1 configuration mode. If there are nondefault serial parameters defined, you need to use the **no interface serial** command first to revert to the default configuration, and then delete the serial interface using the **no channel-group** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to enter interface configuration mode for a serial interface in slot 6, subslot 2, port 4, T1 channel number 10 and channel group 8:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/6/2/4/10:8
RP/0/RSP0/CPU0:router(config-if)#
```

The following example shows how to reference the serial interface on channel group 3 of T1 channel group 4 on port 2 of a SPA in subslot 1 and enter subinterface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/0/1/2/4:3
RP/0/RSP0/CPU0:router(config-if)#
```

**Related Commands**

| Command                                      | Description                                                                             |
|----------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">channel-group, on page 939</a>   | Configures a DS0 channel group and enters channel group configuration mode.             |
| <a href="#">show interfaces, on page 490</a> | Displays statistics for all interfaces configured on the router or for a specific node. |

# invert

To invert the data stream on a serial interface, use the **invert** command in serial configuration mode. To disable data inversion, use the **no** form of this command.

**invert**

**no invert**

**Syntax Description** This command has no keywords or arguments.

**Command Default** Data is not inverted.

**Command Modes** Serial 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.

To verify that data inversion is configured on the interface, use the **show interfaces serial** command.

| Task ID | Task ID | Operations  |
|---------|---------|-------------|
|         | hdlc    | read, write |

**Examples** In the following example, data inversion is enabled on serial interface 0/3/0/0/0:10:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:10
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# invert
```

| Related Commands | Command                                       | Description                                                                             |
|------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------|
|                  | <a href="#">show interfaces</a> , on page 490 | Displays statistics for all interfaces configured on the router or for a specific node. |

# iphc profile

To create an IP header compression (IPHC) profile and enter the IPHC profile configuration mode, use the **iphc profile** command in configuration mode. To remove the profile, use the **no** form of this command.

**iphc profile** *profile-name* **type** {ietf| iphc}

**no iphc profile** *profile-name* [**type** {ietf| iphc}]

## Syntax Description

|                     |                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------|
| <i>profile-name</i> | Text name for the IPHC profile. The maximum number of characters is 50.                                         |
| <b>type</b>         | Specifies the type of compression format.                                                                       |
| <b>ietf</b>         | Specifies Internet Engineering Task Force (IETF) standard format. Uses RFC2507 and RFC2508 compression schemes. |
| <b>iphc</b>         | Specifies Internet Protocol Header Compression (IPHC) format. Provides options similar to IETF.                 |

## Command Default

No default behavior or values

## Command Modes

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.

After you create a profile and enter the IPHC profile configuration mode, you can configure IPHC features in the profile and attach the profile to multiple interfaces. The maximum number of profiles allowed on a router is 250.

A profile cannot be deleted if it is attached to any interfaces. You must remove the profile from all interfaces first. Then, delete the profile using the **no** form of this command.

On-the-fly modifications to IPHC profiles are not supported.

A profile name cannot exceed 50 characters. If you attempt to create a profile name that exceeds 50 characters, you receive the following error message:

```
iphc profile test1test1test1test1test1test1test1test1test1 type iphc
!!% 'iphc_profilemgr' detected the 'warning' condition
```

```
'Name is longer than allowed character length of 50'
!
```

## Examples

The following example shows how to create the IPHC profile Profile\_1

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)#
```

## ipv4 iphc profile

To attach an IP header compression (IPHC) profile to an interface, use the **ipv4 iphc profile** command in interface configuration mode. To remove the profile from the interface, use the **no** form of this command.

**ipv4 iphc profile** *profile-name* [**mode service-policy**]

**no ipv4 iphc profile** [*profile-name* [**mode service-policy**]]

### Syntax Description

|                            |                                                                             |
|----------------------------|-----------------------------------------------------------------------------|
| <i>profile-name</i>        | Text name of the configured IPHC profile to attach to this interface.       |
| <b>mode service-policy</b> | (Optional) Specifies that the IPHC profile applies to a QoS service policy. |

### Command Default

No default behavior or values

### Command Modes

Interface 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.

If the profile name is not recognized the system returns the following error message:

```
!!% 'iphc_ma' detected the 'warning' condition 'Profile doesn't exist'
```

If the encapsulation on the interface is not supported, the system returns the following error message:

```
!!% 'iphc_ma' detected the 'warning' condition 'IPHC capability: Encap type not supported'
```

### Task ID

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |
| ipv4        | read, write |

## Examples

The following example shows how to attach an IP header compression (IPHC) profile to an interface.

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ipv4 iphc profile Profile_1
```

The following example shows how to attach an IPHC profile that applies to a QoS service policy to an interface:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ipv4 iphc profile Profile_1 mode service-policy
```



## keepalive (serial)

To set the keepalive timer for a specific serial 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.                                                                                      |
| <b>disable</b>  | Turns off the keepalive timer.                                                                                                                                       |
| <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 down state. The default is 5. |

### Command Default

The default interval is 10 seconds between keepalive messages. The default retry is 5 keepalive messages that can be sent without a response. However, when more than 5 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 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.

HDLC keepalives require that the **keepalive** command is configured the same way on both ends of a single connection. The two connected routers have no way of negotiating the keepalive value because there is no way for one router to tell the other about its configured values. The keepalive value configured on each router (local or 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 *interval* argument.

By default, if more than five keepalive messages are sent to a peer and no response is received from the peer, then the link transitions to the down state.

**Task ID**

| Task ID | Operations  |
|---------|-------------|
| hdlc    | read, write |

**Examples**

The following example shows how to configure keepalives for 3 seconds on serial interface 0/7/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/7/0/1
RP/0/RSP0/CPU0:router(config-if)# keepalive 3
```

**Related Commands**

| Command                                       | Description                                                                             |
|-----------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show interfaces</a> , on page 490 | Displays statistics for all interfaces configured on the router or for a specific node. |

# max-header

To define the maximum size header that can be compressed, use the **max-header** command in IPHC profile configuration mode. To return to the default maximum size, use the **no** form of this command.

**max-header** *number-of-bytes*

**no max-header** [ *number-of-bytes* ]

## Syntax Description

|                        |                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------|
| <i>number-of-bytes</i> | Maximum size, in bytes, of a header that can be compressed. The range is from 20 to 40. The default is 40. |
|------------------------|------------------------------------------------------------------------------------------------------------|

## Command Default

*Number-of-bytes*; 40.

## Command Modes

IPHC profile 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

The maximum header size can be configured only within an IPHC profile.

## Task ID

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

## Examples

The following example shows how to define the maximum size header that can be compressed.

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# max-header 20
```

## non-tcp compression

To enable non-TCP compression in an IP header compression (IPHC) profile, use the **non-tcp compression** command in IPHC profile configuration mode. To disable non-TCP compression in the profile, use the **no** form of this command.

**non-tcp compression**

**no non-tcp**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** IPHC profile 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**

NON-TCP compression can be enabled only within an IPHC profile. Non-TCP compression does not work unless it is enabled under a profile.

| Task ID | Task ID     | Operations  |
|---------|-------------|-------------|
|         | ip-services | read, write |

**Examples** The following example shows how to enable NON-TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# non-tcp compression
```

## non-tcp context absolute

To configure the maximum number of non-TCP contexts that are allowed for IPHC under a profile, use the **non-tcp context absolute** command in IPHC profile configuration mode. To remove the non-TCP context from the profile, use the **no** form of this command.

**non-tcp context absolute** *number-of-contexts*

**no non-tcp context** [**absolute** [ *number-of-contexts* ]]

### Syntax Description

|                           |                                                                                                                                       |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <i>number-of-contexts</i> | Numeric value that specifies the maximum number of non-TCP contexts allowed for IPHC under this profile. The range is from 0 to 6000. |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|

### Command Default

If the number of contexts is not specified, and only non-TCP compression is enabled, the default number of contexts is 16.

### Command Modes

IPHC profile 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.

The maximum allowed number of non-tcp contexts on a Line Card, across all IPHC profiles and interfaces, is 6000.



#### Note

Non-TCP context can be set only within an IPHC profile.

### Task ID

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

## Examples

The following example shows how to enable non-TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# non-tcp context absolute 255
```

## refresh max-period

To configure the maximum number of compressed IP header packets exchanged on a link before IPHC context is refreshed, use the **refresh max-period** command in IPHC profile configuration mode. To return to the default context refresh settings, use the **no** form of this command.

**refresh max-period** {*max-number*| **infinite**}

**no refresh max-period** [*max-number*| **infinite**]

### Syntax Description

|                   |                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <i>max-number</i> | Maximum number of compressed IP header packets allowed between full headers or before the context is refreshed. Range is from 0 to 65535. |
| <b>infinite</b>   | Allows an unlimited number of packets to be exchanged before context refresh.                                                             |

### Command Default

*max-number*: 256

### Command Modes

IPHC profile 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.

To enable the configured context refresh settings for RTP packets, the **refresh rtp** command must be used.



#### Note

The maximum period between context refreshes can be set only within an IPHC profile.

### Task ID

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

## Examples

The following example shows how to configure the maximum number of compressed IP header packets that are exchanged on a link before the context is refreshed, in an IPHC profile.

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# refresh max-period 50
```



# refresh max-time

To configure the maximum time allowed between context refreshes, use the **refresh max-time** command in IPHC profile configuration mode. To return to the default context refresh settings, use the **no** form of this command.

**refresh max-time** [*max-time*] **infinite**

**no refresh max-time** [*max-time*] **infinite**

## Syntax Description

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| <i>max-time</i> | Time, in seconds, between context refreshes. Range is from 0 to 255. |
| <b>infinite</b> | Allows an unlimited time to pass between context refreshes.          |

## Command Default

*max-time*: 5

## Command Modes

IPHC profile 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.

To enable the configured context refresh settings for RTP packets, the **refresh rtp** command must be used.



### Note

The maximum time between context refreshes can be set only within an IPHC profile.

## Task ID

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

## Examples

The following example shows how to configure the maximum allowed time between context refreshes as 60 seconds, in the IPHC profile 'Profile 1':

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# refresh max-time 60
```

# refresh rtp

To enable the configured context refresh settings for RTP packets, use the **refresh rtp** command in IPHC profile configuration mode. To disable context refresh settings for RTP packets, use the **no** form of this command.

**refresh rtp**

**no refresh rtp**

**Syntax Description** This command has no keywords or arguments.

**Command Default** By default, refresh RTP is disabled and only the first packet in the flow is sent as a 'full-header' packet.

**Command Modes** IPHC profile 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.

| Task ID | Task ID     | Operations  |
|---------|-------------|-------------|
|         | ip-services | read, write |

**Examples** The following example shows how to enable the configured refresh settings for RTP packets:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# refresh rtp
```

# rtp

To enable Real Time Protocol (RTP) compression and decompression on the interface, use the **rtp** command in IPHC profile configuration mode. To remove RTP from the interface, use the **no** form of this command.

**rtp**

**no rtp**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** IPHC profile 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** RTP can be enabled only within an IPHC profile.

You must enable RTP before attaching a profile to an interface. If you do not enable RTP first, the router will display the following message: '!!% 'iphc\_capability' detected the 'warning' condition 'IPHC Capability: RTP Compression NOT enabled in the profile'!

| Task ID | Task ID     | Operations  |
|---------|-------------|-------------|
|         | ip-services | read, write |

**Examples** The following example shows how to

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# rtp
```

# scramble

To enable payload scrambling (encryption) on a serial interface, use the **scramble** command in interface configuration mode. To disable scrambling, use the **no** form of this command.

**scramble**

**no scramble**

**Syntax Description** This command has no keywords or arguments.

**Command Default** Scrambling is disabled.

**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.

Scrambling is used to assist clock recovery on the receiving end. Scrambling is designed to randomize the pattern of 1s and 0s carried in the physical layer frame. Randomizing the digital bits can prevent continuous, nonvariable bit patterns—in other words, long strings of all 1s or all 0s. Several physical layer protocols rely on transitions between 1s and 0s to maintain clocking.

Scrambling can prevent some bit patterns from being mistakenly interpreted as alarms by switches placed between the Data Service Units (DSUs).

The local interface configuration must match the remote interface configuration. For example, if you enable scrambling on the local port, you must also do the same on the remote port.

To verify that scrambling is configured on the interface, use the **show interfaces serial** command.

## Task ID

**Examples** In the following example, scrambling is enabled on serial interface 0/3/0/0/0:10:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:10
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# scramble
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t3, on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# serial

To configure the serial parameters and enter serial configuration mode, use the **serial** command in interface configuration mode. To return to the default state of the serial interface, use the **no** form of this command.

**serial**

**no serial**

**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.

Serial interfaces are automatically created for unchannelized ports; for channelized ports, serial interfaces are created when you add T1/E1 channel groups.

| Task ID | Operations  |
|---------|-------------|
| hdlc    | read, write |

**Examples** The following example shows how to enter serial configuration mode:

```
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)#
```

# show iphc idb

To display status information for an IP header compression (IPHC) interface description block (IDB), use the **show iphc idb** command in EXEC mode.

**show iphc idb** {**detail**| **interface** *type interface-path-id* [**detail**]| **location** *node-id* [**detail**]}

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>detail</b>            | Includes statistics information and internal data.                                                                                                                                                                                                                              |
| <b>interface</b>         | Specifies the interface for which IPHC information is to be displayed.                                                                                                                                                                                                          |
| <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. |
| <b>location</b>          | Specifies the node location for which IPHC information is to be displayed.                                                                                                                                                                                                      |
| <i>node-id</i>           | Specifies the fully qualified path of a node.<br>For more information about the syntax for the router, use the question mark (?) online help function.                                                                                                                          |

## Command Default

The default (no parameters) displays information for all interfaces configured for IPHC.

## 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 |
|-------------|------------|
| ip-services | read       |



**Examples**

The following examples show how to display status information for an IP header compression (IPHC) interface description block (IDB).

```
RP/0/RSP0/CPU0:router# show iphc idb interface Serial 0/1/0/1/26:0
```

```
Thu Jan 8 20:25:41.079 UTC
EA Status Codes: Neg Status Code:
 CFG_AS: Cfg Apply Succeed NEG_I: Negotiation Init
 CFG_AF: Cfg Apply Failed NEG_P: Negotiation Progress
 NEG_AS: Neg Apply Succeed NEG_D: Negotiation Done
 NEG_AF: Neg Apply Failed NEG_F: Negotiation Failed

Interface_Name: Serial0/1/0/1/26:0 Ifhandle : 0x02008e00
EA Status : NEG_AS Neg Status: NEG_D
MQC Mode : F Prof_Name : iphcfmt
```

```
RP/0/RSP0/CPU0:router# show iphc idb interface Serial 0/1/0/1/26:0 detail
```

```
Thu Jan 8 20:25:44.731 UTC
EA Status Codes: Neg Status Code:
 CFG_AS: Cfg Apply Succeed NEG_I: Negotiation Init
 CFG_AF: Cfg Apply Failed NEG_P: Negotiation Progress
 NEG_AS: Neg Apply Succeed NEG_D: Negotiation Done
 NEG_AF: Neg Apply Failed NEG_F: Negotiation Failed

Interface_Name: Serial0/1/0/1/26:0 Ifhandle : 0x02008e00
EA Status : NEG_AS Neg Status: NEG_D
MQC Mode : F Prof_Name : iphcfmt
```

|            | Tcp<br>Space | Non-Tcp<br>Space | Max<br>Header | Max<br>Period | Max<br>Time | RTP |
|------------|--------------|------------------|---------------|---------------|-------------|-----|
| Cfg_Option | 1            | 60               | 40            | 256           | 5           | T   |
| Neg_Option | 1            | 50               | 40            | 256           | 5           | T   |

# show iphc ipv4 rtp

To display IPv4 statistics for Real Time Protocol (RTP) and User Datagram Protocol (UDP) packets sent and received on an interface, use the **show iphc ipv4 rtp** command in EXEC mode.

**show iphc ipv4 rtp interface** *type interface-path-id* [**location** *node-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. |
| <b>location</b>          | (Optional) Specifies the location of the interface                                                                                                                                                                                                                              |
| <i>node-id</i>           | (Optional) Node-id entered in the <i>rack/slot/module</i> notation.                                                                                                                                                                                                             |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | 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.



### Caution

These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly, there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| ip-services | read       |

| Task ID       | Operations |
|---------------|------------|
| cisco-support | read       |

## Examples

The following example shows how to display IPv4, Real Time Protocol (RTP), User Datagram Protocol (UDP), and Non-Transmission Control Protocol (non-TCP) statistics about IP header compression (IPHC) packets sent and received on an interface:

```
RP/0/RSP0/CPU0:router# show iphc ipv4 rtp interface Serial 0/1/0/1/26:0

Thu Jan 8 20:28:47.569 UTC
RTP/UDP/IP header compression statistics:
 Interface Serial0/1/0/1/26:0
 Rcvd: 100 total, 93 compressed, 7 full header
 0 dropped, 0 status msgs
 Sent: 0 total, 0 compressed, 0 fullheader, 0 status msgs
 0 bytes saved, 0 bytes sent
 1.00 efficiency improvement factor
```

# show iphc ipv4 tcp

To display IPv4 Transport Control Protocol (TCP) statistics about IP header compression (IPHC) packets sent and received on an interface, use the **show iphc ipv4 tcp** command in EXEC mode.

**show iphc ipv4 tcp interface** *type interface-path-id* [**location** *node-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. |
| <b>location</b>          | (Optional) Specifies the location of the interface                                                                                                                                                                                                                              |
| <i>node-id</i>           | (Optional) Node-id entered in the <i>rack/slot/module</i> notation.                                                                                                                                                                                                             |

## Command Default

No default behavior or values

## Command Modes

EXEC

## Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | 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.



### Caution

These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly, there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

## Task ID

| Task ID     | Operations |
|-------------|------------|
| ip-services | read       |

| Task ID       | Operations |
|---------------|------------|
| cisco-support | read       |

## Examples

The following example shows how to display IPv4, Transport Control Protocol (TCP) statistics about IP header compression (IPHC) packets sent and received on an interface:

```
RP/0/RSP0/CPU0:router# show iphc ipv4 tcp interface Serial 0/1/0/1/26:0
```

```
Thu Jan 8 20:28:54.407 UTC
TCP/IP header compression statistics:
 Interface Serial0/1/0/1/26:0
 Rcvd: 100 total, 93 compressed, 7 full header
 0 dropped, 0 status msgs
 Sent: 0 status msgs
```

# show iphc platform trace

To display platform trace information, such as errors or statistics for a file or a node, use the **show iphc platform trace** command in EXEC mode.

**show iphc platform trace** [**all** | **events** | **errors** [**events**] [**all**] | **internal** [**all** | **errors** [**events**] [**all**] | **events** [**all**]] [**unique** | **wrapping**] [**hexdump**] [**last** *number-of-entries*] [**reverse**] [**stats**] [**tailf**] [**verbose**] [**file** *file-name* **original** *location* *node-id* | **location** {*node-id* | **all** | **mgmt-nodes**}]

## Syntax Description

|                                      |                                                                                                               |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>all</b>                           | (Optional) Displays all platform trace information.                                                           |
| <b>events</b>                        | (Optional) Displays event platform trace information.                                                         |
| <b>unique</b>                        | (Optional) Displays trace information for unique entries with counts.                                         |
| <b>wrapping</b>                      | (Optional) Displays wrapping entries.                                                                         |
| <b>hexdump</b>                       | (Optional) Displays trace information in hexadecimal format.                                                  |
| <b>last</b> <i>number_of_entries</i> | (Optional) Displays trace information for the last specified number of entries. The range is 1 to 4294967295. |
| <b>reverse</b>                       | (Optional) Displays trace information in reverse order (latest traces first).                                 |
| <b>stats</b>                         | (Optional) Displays statistics information for the trace.                                                     |
| <b>tailf</b>                         | (Optional) Displays new traces as they are added.                                                             |
| <b>verbose</b>                       | (Optional) Displays internal debugging information.                                                           |
| <b>file</b> <i>file_name</i>         | (Optional) Displays trace information for the specified file.                                                 |
| <b>original</b>                      | (Optional) Specifies the original location of file.                                                           |
| <b>location</b> <i>node_id</i>       | (Optional) Displays trace information for the specified card location.                                        |
| <b>all</b>                           | (Optional) Displays trace information for all nodes.                                                          |
| <b>mgmt-nodes</b>                    | (Optional) Displays trace information for all management nodes.                                               |

## 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.

The keywords **hexdump**, **last**, **reverse**, **stats**, **tailf**, and **verbose** may be entered in any order.

Use of the keywords **file** and **location** allows any number of desired files or locations to be entered. For more information, use the question mark (?) online help function.

**Caution**

These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly, there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

**Task ID**

| Task ID       | Operations |
|---------------|------------|
| ip-services   | read       |
| cisco-support | read       |

**Examples**

The following example shows how to display platform trace information for a specified location:

```
RP/0/RSP0/CPU0:router# show iphc platform trace all location 0/2/CPU0
Mon Aug 16 06:05:17.906 PDT
6 wrapping entries (24576 possible, 0 filtered, 6 total)
Aug 16 05:53:59.674 iphc_ea/internal 0/2/CPU0 t1 PAL IPHC: LC Platform preinit
Aug 16 05:54:00.255 iphc_ea/internal 0/2/CPU0 t1 PAL IPHC: LC Platform init
Aug 16 05:54:00.255 iphc_ea/internal 0/2/CPU0 t1 PAL IPHC: max iphc interfaces 2048
Aug 16 05:54:00.255 iphc_ea/internal 0/2/CPU0 t1 PAL IPHC: ea respawn count 1
Aug 16 05:54:00.284 iphc_ea/internal 0/2/CPU0 t1 PAL IPHC: LC Platform replay end
Aug 16 05:54:00.284 iphc_ea/internal 0/2/CPU0 t1 PAL IPHC: replay end 0 stale entries
```

# show iphc profile

To display the configuration information of an IP header compression (IPHC) profile, use the **show iphc profile** command in EXEC mode.

**show iphc profile** *{profile-name| all}* [**detail**]

## Syntax Description

|                     |                                                                      |
|---------------------|----------------------------------------------------------------------|
| <i>profile-name</i> | Text name of the IPHC profile for which to display information.      |
| <b>all</b>          | Displays information for all profiles on the router.                 |
| <b>detail</b>       | (Optional) Displays the interfaces to which the profile is attached. |

## 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 |
|-------------|------------|
| ip-services | read       |

## Examples

The following examples show how to display information about an IPHC profile:

```
RP/0/RSP0/CPU0:router# show iphc profile ietf-test1
Tue Aug 10 06:53:19.711 PDT
IPHC Profile: ietf-test1
Type: IETF
Compressing : TCP NON-TCP (RTP)
Context : TCP fixed at 1 NON-TCP fixed at 10
Refresh : NON-TCP every 60 seconds or 100 packets
Feedback : ON
```



```
Max_Header : 40
Refresh RTP : OFF
```

```
RP/0/RSP0/CPU0:router# show iphc profile Profile_1 detail
Thu Jan 8 20:22:24.276 UTC
IPHC Profile: Profile_1
Type: IPHC
 Compressing : TCP NON-TCP (RTP)
 Context : TCP fixed at 1 NON-TCP fixed at 60
 Refresh : NON-TCP every 5 seconds or 256 packets
 Feedback : ON
 Max_Header : 40

*** No of Intf 1 ****
Serial0_4_3_1_1:0
```

```
RP/0/RSP0/CPU0:router# show iphc profile all
Thu Mar 12 11:05:35.987 UTC
IPHC Profiles : 3
IPHC Profile: p1
Type: IETF
 Compressing : TCP NON-TCP (RTP)
 Context : TCP fixed at 1 NON-TCP fixed at 16
 Refresh : NON-TCP every 5 seconds or 256 packets
 Feedback : ON
 Max_Header : 40

IPHC Profile: p2
Type: IETF
 Compressing : TCP NON-TCP (RTP)
 Context : TCP fixed at 1 NON-TCP fixed at 16
 Refresh : NON-TCP every 5 seconds or 256 packets
 Feedback : ON
 Max_Header : 40

IPHC Profile: test
Type: IETF
 Compressing : TCP NON-TCP (RTP)
 Context : TCP fixed at 1 NON-TCP fixed at 16
 Refresh : NON-TCP every 5 seconds or 256 packets
 Feedback : ON
 Max_Header : 40
```

```
RP/0/RSP0/CPU0:router# show iphc profile all detail
Thu Mar 12 11:06:26.902 UTC
IPHC Profiles : 3
IPHC Profile: p1
Type: IETF
 Compressing : TCP NON-TCP (RTP)
 Context : TCP fixed at 1 NON-TCP fixed at 16
 Refresh : NON-TCP every 5 seconds or 256 packets
 Feedback : ON
 Max_Header : 40

*** No of Intf 1 ****
Serial0_4_3_1_1:0

IPHC Profile: p2
Type: IETF
 Compressing : TCP NON-TCP (RTP)
 Context : TCP fixed at 1 NON-TCP fixed at 16
 Refresh : NON-TCP every 5 seconds or 256 packets
 Feedback : ON
 Max_Header : 40

*** No of Intf 2 ****
Serial0_4_3_1_2:0
Serial0_4_3_1_8:0

IPHC Profile: test
```

 show iphc profile

```
Type: IETF
Compressing : TCP NON-TCP (RTP)
Context : TCP fixed at 1 NON-TCP fixed at 16
Refresh : NON-TCP every 5 seconds or 256 packets
Feedback : ON
Max_Header : 40

*** No of Intf 0 ****
```

# show iphc trace all

To display trace results for all IP header compression (IPHC) configurations on the router, use the **show iphc trace all** command in EXEC mode.

**show iphc trace all** [**unique**] [**wrapping**] [**hexdump**] [**last number-of-entries**] [**reverse**] [**stats**] [**tailf**] [**verbose**] [**file file-name**] [**original location node-id**] [**location {node-id}**] [**all**] [**mgmt-nodes**]

## Syntax Description

|                               |                                                                                                                    |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>unique</b>                 | (Optional) Displays trace information for unique entries with counts.                                              |
| <b>wrapping</b>               | (Optional) Displays wrapping entries.                                                                              |
| <b>hexdump</b>                | (Optional) Displays trace information in hexadecimal format.                                                       |
| <b>last number_of_entries</b> | (Optional) Displays trace information for the last specified number of entries. The range is from 1 to 4294967295. |
| <b>reverse</b>                | (Optional) Displays trace information in reverse order (latest traces first).                                      |
| <b>stats</b>                  | (Optional) Displays statistics information for the trace.                                                          |
| <b>tailf</b>                  | (Optional) Displays new traces as they are added.                                                                  |
| <b>verbose</b>                | (Optional) Displays internal debugging information.                                                                |
| <b>file file_name</b>         | (Optional) Displays trace information for the specified file.                                                      |
| <b>original</b>               | (Optional) Specifies the original location of file.                                                                |
| <b>location node_id</b>       | (Optional) Displays trace information for the specified card location.                                             |
| <b>all</b>                    | (Optional) Displays trace information for all nodes.                                                               |
| <b>mgmt-nodes</b>             | (Optional) Displays trace information for all management nodes.                                                    |

## 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.

The keywords **hexdump**, **last**, **reverse**, **stats**, **tailf**, and **verbose** may be entered in any order. The keywords **unique** or **wrapping** may only be entered as the first keyword in the command. The keywords **file** or **location** may only be entered as the last keyword in the command.

Use of the keywords **file** and **location** allows any number of desired files or locations to be entered. For more information, use the question mark (?) online help function.

**Caution**

These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly, there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

**Task ID**

| Task ID       | Operations |
|---------------|------------|
| ip-services   | read       |
| cisco-support | read       |

**Examples**

The following example shows how to display IPHC trace information:

```
RP/0/RSP0/CPU0:router# show iphc trace all

Wed Jul 22 21:48:07.339 DST
20 wrapping entries (3072 possible, 0 filtered, 20 total)
Jul 22 03:31:39.770 iphc/profilemgr/int 0/5/CPU0 t1 : Event Mgr Create Successful
Jul 22 03:31:39.799 iphc/profilemgr/int 0/5/CPU0 t1 : Sysmgr Init Successful
Jul 22 03:31:39.894 iphc/profilemgr/int 0/5/CPU0 t1 : Ens Init Successful
Jul 22 03:31:39.910 iphc/profilemgr/int 0/5/CPU0 t1 : Sysdb Init Successful
Jul 22 03:31:39.911 iphc/profilemgr/int 0/5/CPU0 t1 : Stats thread Init Successful
Jul 22 03:31:39.942 iphc/profilemgr/int 0/5/CPU0 t1 : Cfg thread Init Successful
Jul 22 03:31:39.951 iphc/profilemgr/int 0/5/CPU0 t1 : Registered verifier call7
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Profile: *** Pr*
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Option (format))
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Option (tcp_com)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Option (tcp_con)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Option (non_tcp)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Option (rtpt) in
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Option (max-per)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Scanning Option (non_tcp)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : +++++ Profile Verificati+
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1 : Verify Profile (Profile n
Jul 22 03:31:39.959 iphc/profilemgr/eve 0/5/CPU0 t1 : +++++ Profile Verificati+
Jul 22 03:31:39.981 iphc/profilemgr/int 0/5/CPU0 t1 : Registered applier calle7
Jul 22 03:31:39.999 iphc/profilemgr/eve 0/5/CPU0 t1 : Registered Profile (Profy
```

# show tech-support iphc

To collect and display IP header compression (IPHC) data for an interface, node, or rack, and store that data in a file, use the **show tech-support iphc** command in EXEC mode.

**show tech-support iphc** [**file**| **interface** *type interface-path-id* [**location** *node-id*| **rack** *rack\_name*]] [**location** *node-id*| **rack** *rack\_name*] **file** *location file\_name* [**background**] [**compressed**| **uncompressed**]

## Syntax Description

|                                |                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>file</b>                    | (Optional) Specifies a file name and location for IPHC data to be saved to.                                                                                                                                                                                                                |
| <b>interface</b>               | (Optional) Collects IPHC data for the specified interface.                                                                                                                                                                                                                                 |
| <i>type</i>                    | (Optional) Interface type. For more information, use the question mark (?) online help function.                                                                                                                                                                                           |
| <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>location</b> <i>node-id</i> | (Optional) Collects IPHC data for the specified card location ( <i>node-id</i> ).                                                                                                                                                                                                          |
| <b>rack</b> <i>rack_name</i>   | (Optional) Collects IPHC data for the specified rack.                                                                                                                                                                                                                                      |

**file location** *file\_name* Stores the collected data in the specified file (*file\_name*) in one of the following valid file locations:

- bootflash:—stores the collected data to a bootflash file-system file.
- compactflash:—stores the collected data to a compactflash file-system file.
- compactflasha:—stores the collected data to a compactflasha file-system file.
- disk0:—stores the collected data to a disk0 file-system file.
- disk0a:—stores the collected data to a disk0a file-system file.
- disk1:—stores the collected data to a disk1 file-system file.
- disk1a:—stores the collected data to a disk1a file-system file.
- ftp:—stores the collected data to an ftp file-system file.
- harddisk:—stores the collected data to a harddisk file-system file.
- harddiska:—stores the collected data to a harddiska file-system file.
- harddiskb:—stores the collected data to a harddiskb file-system file.
- lcdisk0:—stores the collected data to a lcdisk0 file-system file.
- lcdisk0a:—stores the collected data to a lcdisk0a file-system file.
- nvram:—stores the collected data to an nvram file-system file.
- rcp:—stores the collected data to an rcp file-system file.
- tftp:—stores the collected data to a tftp file-system file.

|                   |                                                 |
|-------------------|-------------------------------------------------|
| <b>background</b> | (Optional) Runs this command in the background. |
|-------------------|-------------------------------------------------|

|                   |                                   |
|-------------------|-----------------------------------|
| <b>compressed</b> | (Optional) Compresses the output. |
|-------------------|-----------------------------------|

|                     |                                          |
|---------------------|------------------------------------------|
| <b>uncompressed</b> | (Optional) Does not compress the output. |
|---------------------|------------------------------------------|

|                        |                               |
|------------------------|-------------------------------|
| <b>Command Default</b> | No default behavior or values |
|------------------------|-------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 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 |
|----------------|------------|
| basic-services | read       |
| cisco-support  | read       |
| ipv4           | read       |

**Examples**

The following example shows how to collect and display IP header compression (IPHC) data:

```
RP/0/RSP0/CPU0:router# show tech-support iphc

Mon Oct 12 20:30:58.660 DST
++ Show tech start time: 2009-Oct-12.203059.DST ++
Mon Oct 12 20:31:05 DST 2009 Waiting for gathering to complete
.....
Mon Oct 12 20:31:46 DST 2009 Compressing show tech output
Show tech output available at 0/5/CPU0 : disk0:/showtech/showtech-iphc-2009-Octz
++ Show tech end time: 2009-Oct-12.203148.DST ++
```

## tcp compression

To enable TCP compression in an IP header compression (IPHC) profile, use the **tcp compression** command in IPHC profile configuration mode. To disable TCP compression in the profile, use the **no** form of this command.

**tcp compression**

**no tcp**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** IPHC profile configuration

| 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.

Where the IPHC profile used by a router is configured using this command, the router will negotiate TCP compression with its peer router and decompress any compressed TCP packets sent by its peer. TCP packets transmitted to the peer are transmitted uncompressed.



**Note**

TCP compression can be enabled only within an IPHC profile. TCP compression does not work unless it is enabled under a profile.

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

**Examples** The following example shows how to enable TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
```



```
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# tcp compression
RP/0/RSP0/CPU0:router(config-iphc-profile)#
```

## tcp context absolute

To configure the maximum number of TCP contexts that are allowed for IPHC under a profile, use the **tcp context absolute** command in IPHC profile configuration mode. To remove the TCP context from the profile, use the **no** form of this command.

**tcp context absolute** *number-of-contexts*

**no tcp context [absolute] [ *number-of-contexts* ]**

### Syntax Description

|                           |                                                                                                                                  |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <i>number-of-contexts</i> | Numeric value that specifies the maximum number of TCP contexts allowed for IPHC under this profile. The range is from 0 to 255. |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|

### Command Default

If *number-of-contexts* is not specified, and only TCP compression is enabled, the default *number-of-contexts* is 1.

### Command Modes

IPHC profile 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.

The maximum allowed number of tcp contexts on a Line Card, across all IPHC profiles and interfaces, is 255.



#### Note

TCP context can be set only within an IPHC profile.

### Task ID

| Task ID     | Operations  |
|-------------|-------------|
| ip-services | read, write |

## Examples

The following example shows how to enable TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# tcp context absolute 255
```

## transmit-delay (serial)

To specify a number of High-Level Data Link Control (HDLC) flag sequences to be inserted between the packets, use the **transmit-delay** command in serial 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 128. The default is 0 (disabled). |
|---------------------|----------------------------------------------------------------------------------------------------------------------|

### Command Default

*microseconds*: 0 (disabled)

### Command Modes

Serial configuration

### Command History

| Releases      | Modifications                |
|---------------|------------------------------|
| 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  |
|---------|-------------|
| hdlc    | read, write |

### Examples

In the following example, a delay of 2 microseconds is specified on serial interface 0/3/0/0/0:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:0
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# transmit-delay 2
```

In the following example, the transmit delay on serial interface 0/3/0/0/0 is disabled:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:0
```

```
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# no transmit-delay
```

**Related Commands**

| Command                                      | Description                                                                             |
|----------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">show interfaces, on page 490</a> | Displays statistics for all interfaces configured on the router or for a specific node. |

 **transmit-delay (serial)**



# SONET Controller Commands on the Cisco ASR 9000 Series Router

---

This module provides command line interface (CLI) commands for configuring SONET operation, using Layer 1 SONET transport technology, on the Cisco ASR 9000 Series 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 serial 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 817](#)
- [ais-shut \(SONET path\), page 819](#)
- [aps group, page 821](#)
- [aps group \(global\), page 824](#)
- [au, page 826](#)
- [authenticate \(PGP\), page 828](#)
- [b3-ber-prdi, page 830](#)
- [channel local, page 831](#)
- [channel remote, page 833](#)
- [clear counters sonet, page 835](#)
- [clock source \(SONET\), page 837](#)
- [controller \(SONET\), page 839](#)
- [delay clear, page 841](#)
- [delay trigger, page 843](#)
- [down-when-looped, page 845](#)
- [framing \(SONET\), page 846](#)

- [line delay clear](#), page 848
- [line delay trigger](#), page 850
- [lockout](#), page 852
- [loopback \(SONET\)](#), page 854
- [mode \(SONET\)](#), page 856
- [overhead \(SONET\)](#), page 858
- [overhead \(SONET path\)](#), page 860
- [path delay clear](#), page 862
- [path delay trigger](#), page 864
- [path \(SONET\)](#), page 866
- [report \(SONET\)](#), page 868
- [report \(SONET path\)](#), page 870
- [revert](#), page 872
- [scrambling disable \(SONET path\)](#), page 874
- [show aps](#), page 875
- [show aps agents](#), page 877
- [show aps group](#), page 879
- [show controllers pos](#), page 882
- [show controllers sonet](#), page 888
- [show sonet-local trace frr](#), page 896
- [shutdown \(SONET\)](#), page 898
- [signalling](#), page 900
- [sts](#), page 902
- [timers \(APS\)](#), page 903
- [threshold \(SONET\)](#), page 905
- [threshold \(SONET path\)](#), page 907
- [tug3](#), page 909
- [uneq-shut \(SONET path\)](#), page 911
- [unidirectional](#), page 912
- [width](#), page 914



## 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 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.

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/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# ais-shut
```

**Related Commands**

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 888</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 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 **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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# ais-shut
```

**Related Commands**

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 888</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 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.

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/RSP0/CPU0:router# aps group 1 force 1 enable
RP/0/RSP0/CPU0:router# aps group 1 force 1 disable
```

```
RP/0/RSP0/CPU0:router# aps group 1 manual 1 enable
RP/0/RSP0/CPU0:router# aps group 1 manual 1 disable
```

```
RP/0/RSP0/CPU0:router# aps group 1 force 0 enable
RP/0/RSP0/CPU0:router# aps group 1 force 0 disable
```

```
RP/0/RSP0/CPU0:router# aps group 1 manual 0 enable
RP/0/RSP0/CPU0:router# aps group 1 manual 0 disable
```

**Related Commands**

| Command                                         | Description                                                                                                                       |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode.                                        |
| <a href="#">lockout, on page 852</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</a> , <a href="#">on page 872</a>     | Enables automatic switchover from the protect interface to the working interface after the working interface becomes available. |
| <a href="#">signalling</a> , <a href="#">on page 900</a> | Configures the K1K2 overhead byte signaling protocol used for APS.                                                              |
| <a href="#">show aps</a> , <a href="#">on page 875</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 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.

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/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)#
```



**Related Commands**

| Command                                         | Description                                                                                                                              |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group, on page 821</a>          | Manually switches an APS channel.                                                                                                        |
| <a href="#">authenticate (PGP), on page 828</a> | Configures the authentication string for the PGP message exchange between the protect and working routers.                               |
| <a href="#">channel local, on page 831</a>      | Assigns local SONET physical ports as SONET APS channels in the current APS group.                                                       |
| <a href="#">channel remote, on page 833</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 852</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 872</a>             | Enables automatic switchover from the protect interface to the working interface after the working interface becomes available.          |
| <a href="#">signalling, on page 900</a>         | Configures the K1K2 overhead byte signaling protocol used for APS.                                                                       |
| <a href="#">timers (APS), on page 903</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 912</a>     | Configures a protect interface for unidirectional mode.                                                                                  |
| <a href="#">show aps, on page 875</a>           | Displays the operational status for all configured SONET APS groups.                                                                     |

## au

To specify the administrative unit (AU) group number and enter the AU controller configuration mode, use the **au** command in SONET controller configuration mode.

**au** *number*

### Syntax Description

|               |                                                             |
|---------------|-------------------------------------------------------------|
| <i>number</i> | Administrative unit group number in the range from 1 to 48. |
|---------------|-------------------------------------------------------------|

### Command Default

The default is 1.

### Command Modes

SONET 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.

The **au** command enables you to begin configuring the interface in the AU controller configuration mode, where you can configure tributary unit groups (TUGs), virtual containers (VCs), and DS3s, such as shown in the following path example:

STM-1 -> AU-4 -> TUG-3 -> VC-3 -> DS-3

One AU-4 path is equivalent to three AU-3 paths. An administrative unit type 4 (AU-4) consists of three STM-1s or one STM-3. An administrative unit type 3 (AU-3) consists of one STM-1.



#### Note

Use the **au** command to configure one of the AUGs available for your card. The **au** command is not used to configure the *type* of AU path that you are configuring, such as AU-3 or AU-4, but rather is used to identify one AU group number in the supported range for the card and AU type that you are configuring. For example, the 1-Port Channelized OC-48/STM-16 SPA supports 16 AU-4 groups. Therefore, you can specify a number between 1 and 16 for the **au** command to configure SDH AU-4 on that card.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to specify AU 1.

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# au 1
RP/0/RSP0/CPU0:router(config-auPath)#
```

## Related Commands

| Command                           | Description                                                                                        |
|-----------------------------------|----------------------------------------------------------------------------------------------------|
| <a href="#">tug3, on page 909</a> | Specifies the tributary unit group (TUG) number and enters the TUG3 controller configuration mode. |

# 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 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 **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/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# authenticate abctown
```

## Related Commands

| Command                                         | Description                                                                                                           |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode.                            |
| <a href="#">channel local, on page 831</a>      | Assigns local SONET physical ports as SONET APS channels in the current APS group.                                    |
| <a href="#">channel remote, on page 833</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 875</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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# b3-ber-prdi
```

| Related Commands | Command                                              | Description                                                        |
|------------------|------------------------------------------------------|--------------------------------------------------------------------|
|                  | <a href="#">path (SONET)</a> , on page 866           | Enters SONET/SDH path configuration mode.                          |
|                  | <a href="#">show controllers sonet</a> , on page 888 | 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 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.

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/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# channel 0 local SONET 0/2/0/2
```

## Related Commands

| Command                                         | Description                                                                                                           |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode.                            |
| <a href="#">channel remote, on page 833</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 875</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 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 **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.

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/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# channel 1 remote 192.168.1.1
```

## Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">channel local, on page 831</a>      | Assigns local SONET physical ports as SONET APS channels in the current APS group.         |
| <a href="#">show aps, on page 875</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.<br><br><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 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.

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/RSP0/CPU0:router# clear counters sonet 0/1/0/0
```

**Related Commands**

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 888</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 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 **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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# clock source internal
```

**Related Commands**

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 888</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><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 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.

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

### Examples

The following example shows how to enter SONET/SDH configuration mode for the SONET controller in slot number 2:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/2/0/1
RP/0/RSP0/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/RSP0/CPU0:router(config)# controller SONET 0/2/0/1 path b3-ber-prdi
RP/0/RSP0/CPU0:router(config-sonet)#
```

### Related Commands

| Command                                              | Description                                                        |
|------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">path (SONET)</a> , on page 866           | Enters SONET/SDH path configuration mode.                          |
| <a href="#">show controllers sonet</a> , on page 888 | 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 3.9.0 | 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 how to specify that STS path delay trigger alarms should be cleared after 7000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/3
RP/0/RSP0/CPU0:router(config-sonet)# sts 1
RP/0/RSP0/CPU0:router(config-stsPath)# delay clear 7000
```

 delay clear**Related Commands**

| Command                                    | Description                                             |
|--------------------------------------------|---------------------------------------------------------|
| <a href="#">delay trigger, on page 843</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 3.9.0 | 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 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/RSP0/CPU0:router(config)# controller sonet 0/2/0/3
RP/0/RSP0/CPU0:router(config-sonet)# sts 1
RP/0/RSP0/CPU0:router(config-stsPath)# delay trigger 6000
```

**Related Commands**

| Command                                                   | Description                                                                     |
|-----------------------------------------------------------|---------------------------------------------------------------------------------|
| <a href="#">delay clear</a> , <a href="#">on page 841</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

| 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 does not have a **no** form.

| 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/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# down-when-looped

down-when-looped is a traffic-affecting operation
```

| Command                                        | Description                                        |
|------------------------------------------------|----------------------------------------------------|
| <a href="#">loopback (SONET)</a> , on page 854 | Configures the SONET controller for loopback mode. |

## 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 3.9.0 | This command was introduced.          |
| Release 4.0.0 | The <b>sdh</b> keyword was supported. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
```

```
RP/0/RSP0/CPU0:router(config-sonet)# framing sdh
```

In the following example, the SONET controller is configured for SONET framing:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# framing sonet
```

#### Related Commands

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 888</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 3.9.0 | 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 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/RSP0/CPU0:router(config)# controller SONET 0/0/0/2
RP/0/RSP0/CPU0:router(config-sonet)# line delay clear 4000
```



**Related Commands**

| Command                                         | Description                                                   |
|-------------------------------------------------|---------------------------------------------------------------|
| <a href="#">line delay trigger, on page 850</a> | 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 3.9.0 | 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 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/RSP0/CPU0:router(config)# controller SONET 0/0/0/2
RP/0/RSP0/CPU0:router(config-sonet)# line delay trigger 3000
```

**Related Commands**

| Command                                                        | Description                                                                           |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <a href="#">line delay clear</a> , <a href="#">on page 848</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 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 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/RSP0/CPU0:router(config)# aps group 1
```

```
RP/0/RSP0/CPU0:router(config-aps)# lockout 0
```

**Related Commands**

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">aps group, on page 821</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 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 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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# loopback internal
```

**Related Commands**

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 888</a> | Displays information about the operational status of SONET layers. |

## mode (SONET)

To set the mode of an STS path, AU path, T3 controller, or TUG3 controller, use the **mode** command in the applicable controller configuration mode. To disable the mode, use the **no** form of this command.

### STS Controller Configuration Mode

**mode** {t3| vt15-t1| pos}

**no mode** {t3| vt15-t1| pos}

### AU Controller Configuration Mode

**mode** {e3| t3| tug 3}

**no mode** {e3| t3| tug 3}

### T3 Controller Configuration Mode

**mode** {e1| serial| t1}

**no mode** {e1| serial| t1}

### TUG3 Controller Configuration Mode

**mode** {c12| c12-e1| e3| serial| t3}

**no mode** {c12| c12-e1| e3| serial| t3}

### Syntax Description

|                |                                                                                        |
|----------------|----------------------------------------------------------------------------------------|
| <b>t3</b>      | Specifies the mode of the port to be channelized as an AU3 or a TUG3 path carrying T3. |
| <b>vt15-t1</b> | Specifies the mode of the port to be channelized VT15-T1.                              |
| <b>pos</b>     | Specifies the mode of the port to be channelized POS.                                  |
| <b>tug3</b>    | Specifies the mode of the port to be channelized TUG3.                                 |
| <b>e1</b>      | Specifies the mode of the port to be channelized E1.                                   |
| <b>serial</b>  | Specifies the mode of the port to be clear channel serial.                             |
| <b>t1</b>      | Specifies the mode of the port to be channelized T1.                                   |
| <b>c12</b>     | Specifies the mode of the port to be channelized as a TUG3 path carrying TU-12.        |
| <b>c12-e1</b>  | Specifies the mode of the port to be channelized be TUG3 path carrying c12 to E1.      |
| <b>e3</b>      | Specifies the mode of the port to be channelized as an AU3 or a TUG3 path carrying E3. |



**Command Default** No default behavior or values

**Command Modes** STS controller configuration  
AU controller configuration  
T3 controller configuration  
TUG3 controller configuration

| Command History | Release       | Modification                                                                                                   |
|-----------------|---------------|----------------------------------------------------------------------------------------------------------------|
|                 | Release 3.9.0 | This command was introduced.                                                                                   |
|                 | Release 4.0.0 | The <b>pos</b> , <b>tug3</b> , <b>e1</b> , <b>c12</b> , <b>c12-e1</b> , and <b>e3</b> keywords were supported. |
|                 |               |                                                                                                                |

**Usage Guidelines** To use this command, you must be in a user group associated with a task 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 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 set the mode of a T3 controller to channelized T1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# mode t1
```

| Related Commands | Command                                             | Description                           |
|------------------|-----------------------------------------------------|---------------------------------------|
|                  | <a href="#">width</a> , <a href="#">on page 914</a> | Sets the number of paths in a stream. |

## 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>       | Sets the SS bits value of the H1 byte in the SONET line overhead.<br>Use the following values to tell the SONET transmission equipment the S1 and S0 bit: <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> Range is from 0 to 3. Default is 0. Values 1 and 3 are undefined. |
| <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 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 **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/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/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/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/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> <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 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 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.

### Examples

The following example shows how to set the STS SPE C2 byte in the SONET path frame header:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# overhead c2 0x13
```

### Related Commands

| Command                                                      | Description                                  |
|--------------------------------------------------------------|----------------------------------------------|
| <a href="#">scrambling disable (SONET path), on page 874</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 3.9.0 | 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 how to specify that SONET/SDH path delay trigger alarms should be cleared after 7000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/0/0/1
RP/0/RSP0/CPU0:router(config-sonet)# path delay clear 7000
```

**Related Commands**

| Command                                          | Description                                                   |
|--------------------------------------------------|---------------------------------------------------------------|
| <a href="#">path delay trigger</a> , on page 864 | 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 3.9.0 | 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 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/RSP0/CPU0:router(config)# controller SONET 0/0/0/1
RP/0/RSP0/CPU0:router(config-sonet)# path delay trigger 6000
```



**Related Commands**

| Command                                        | Description                                                                           |
|------------------------------------------------|---------------------------------------------------------------------------------------|
| <a href="#">path delay clear</a> , on page 862 | 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 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 how to access SONET path submode from SONET controller configuration mode:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# path
```

### Related Commands

| Command                                            | Description                                                                                                                  |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">ais-shut (SONET path), on page 819</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 830</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 841</a>                     | Configures the amount of time before a STS path delay trigger alarm is cleared.                                                                              |
| <a href="#">delay trigger, on page 843</a>                   | Configures a time value for the STS path delay trigger.                                                                                                      |
| <a href="#">overhead (SONET path), on page 860</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 870</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 874</a> | Disables payload scrambling on a SONET path.                                                                                                                 |
| <a href="#">threshold (SONET path), on page 907</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 911</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 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.

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/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/CPU0:router(config-sonet)# report lais
```

**Related Commands**

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 888</a> | 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 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.

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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# report pais
```

**Related Commands**

| Command                                             | Description                                                        |
|-----------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet, on page 888</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 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 **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/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# revert 5
```

## Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps, on page 875</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

| 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.

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.

**Examples** In the following example, scrambling is disabled for the path:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# scrambling disable
```

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 888</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**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no keywords or arguments. |
|---------------------------|--------------------------------------------|

|                        |                               |
|------------------------|-------------------------------|
| <b>Command Default</b> | No default behavior or values |
|------------------------|-------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <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.

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.

**Examples**

The following is sample output from the **show aps** command:

```
RP/0/RSP0/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 53: 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 877 | Displays the status of the APS WP distributed communication subsystem. |
| <a href="#">show aps group</a> , on page 879  | 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 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 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/RSP0/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:
```

**show aps agents**

```

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 54: 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> , on page 875 | 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 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 **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/RSP0/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 55: 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 875</a>        | Displays the operational status for all configured SONET APS groups.   |
| <a href="#">show aps agents, on page 877</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 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 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/RSP0/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/RSP0/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
```

## show controllers pos

```

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

```

```

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_fl_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 56: 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 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.

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/RSP0/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 : Pl_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 57: 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/RSP0/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/RSP0/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 58: 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. |

# show sonet-local trace frr

To display the alarms associated with Fast Re-Route (FRR) for all nodes or for a specific node, use the **show sonet-local trace frr** command in EXEC mode.

**show sonet-local trace frr location** *node-id*

## Syntax Description

**location** *node-id*

Full path location of the node.

For more information about the syntax for the router, use the question mark (?) online help function.

## Command Default

Displays the FRR alarms for all nodes on the router.

## 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

cisco-support

read

## Examples

The following example shows how to display the FRR alarms for a specific node:

```
RP/0/RSP0/CPU0:router# show sonet-local trace frr location 0/1/0/0
```

The following example shows how to display the FRR alarms for all nodes on the router:

```
RP/0/RSP0/CPU0:router# show sonet-local trace frr
```



**Related Commands**

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 888</a> | Displays information about the operational status of SONET layers. |

## 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 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 **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/RSP0/CPU0:router(config)# controller sonet 0/1/0/2
RP/0/RSP0/CPU0:router(config-sonet)# shutdown
```

**Related Commands**

| Command                                                              | Description                                                        |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <a href="#">show controllers sonet</a> , <a href="#">on page 888</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 3.9.0 | This command was introduced.          |
| Release 4.0.0 | The <b>sdh</b> keyword was supported. |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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.

## Examples

The following example shows how to reset the signaling protocol from the default SONET value to SDH:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
```

```
RP/0/RSP0/CPU0:router(config-aps)# signalling sdh
```

The following example sets the signaling to SONET:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# signalling sonet
```

#### Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps group, on page 879</a>     | Displays information about the APS groups.                                                 |

## sts

To specify the Synchronous Transport Signal (STS) path and enter the STS controller configuration mode, use the **sts** command in SONET controller configuration mode.

**sts** *number*

### Syntax Description

|               |                                                             |
|---------------|-------------------------------------------------------------|
| <i>number</i> | STS path number. The range varies by the type of line card. |
|---------------|-------------------------------------------------------------|

### Command Default

No default behavior or values

### Command Modes

SONET controller 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 how to specify STS 1:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# sts 1
RP/0/RSP0/CPU0:router(config-stsPath)#
```

### Related Commands

| Command                          | Description                                                                                          |
|----------------------------------|------------------------------------------------------------------------------------------------------|
| <a href="#">au</a> , on page 826 | Specifies the administrative unit (AU) group number and enters the AU controller configuration mode. |

## 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 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 **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/RSP0/CPU0:router(config)# aps group 3
RP/0/RSP0/CPU0:router(config-aps)# timers 2 6
```

## Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps group, on page 879</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 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.

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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# threshold sd-ber 8
RP/0/RSP0/CPU0:router(config-sonet)# threshold sf-ber 4
RP/0/RSP0/CPU0:router(config-sonet)# threshold b1-tca 4
```

## Related Commands

| Command                                              | Description                                                                       |
|------------------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">report (SONET)</a> , on page 868         | Permits selected SONET alarms to be logged to the console for a SONET controller. |
| <a href="#">show controllers sonet</a> , on page 888 | 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 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.

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/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# threshold b3-tca 4
```

## Related Commands

| Command                                                              | Description                                                                       |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">report (SONET)</a> , <a href="#">on page 868</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 888</a> | Displays information about the operational status of SONET layers.                |

# tug3

To specify the tributary unit group (TUG) number and enter the TUG3 controller configuration mode, use the **tug3** command in SONET controller configuration mode.

**tug3** *number*

## Syntax Description

|               |                                                                                                                                                                      |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>number</i> | The tributary unit group (TUG) number. The ranges are: <ul style="list-style-type: none"><li>• AU4—The only value is 1.</li><li>• AU3—The range is 1 to 3.</li></ul> |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

The default is 1.

## Command Modes

SONET 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.

The **tug3** command enables you to begin configuring the interface in the TUG3 controller configuration mode, where you can configure virtual containers (VCs) and DS3s:

STM1 -> AU4 -> TUG3 -> VC-3 -> DS3

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to specify tug3 1.

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# au 1
RP/0/RSP0/CPU0:router(config-auPath)# tug3 1
```

```
RP/0/RSP0/CPU0:router(config-tug3Path)#
```

**Related Commands**

| Command                                          | Description                                                                                          |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <a href="#">au</a> , <a href="#">on page 826</a> | Specifies the administrative unit (AU) group number and enters the AU controller configuration mode. |

## 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 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 **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/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/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 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 **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/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# unidirectional
```

## Related Commands

| Command                                         | Description                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------|
| <a href="#">aps group (global), on page 824</a> | Adds an automatic protection switching (APS) group and enter APS group configuration mode. |
| <a href="#">show aps, on page 875</a>           | Displays the operational status for all configured SONET APS groups.                       |

# width

To set the number of paths in a stream, use the **width** command in the STS or AU controller configuration mode.

**width** *number*

## Syntax Description

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>number</i> | Number of STS streams that are concatenated. The possible values are: <ul style="list-style-type: none"><li>• 1—Indicating one STS stream</li><li>• 3—Indicating three STS streams (STS-3c)</li><li>• 12—Indicating concatenation of 12 STS streams (STS-12c)</li><li>• 48—Indicating concatenation of 48 STS streams (STS-48c)</li></ul> Widths 3, 12, and 48 are configured on STS paths at natural boundaries, which coincide with the following path numbers: <ul style="list-style-type: none"><li>• 1, 4, 7, 10, and so on, for STS-3c</li><li>• 1, 13, 25, and 37 for STS-12c</li><li>• 1 for STS-48c</li></ul> |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Command Default

The default is 1.

## Command Modes

SONET 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.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to specify a width of 3:

```
RP/0/0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/0/CPU0:router(config-sonet)# sts 1
RP/0/0/CPU0:router(config-stsPath)# width 3
```

## Related Commands

| Command                                   | Description                                                               |
|-------------------------------------------|---------------------------------------------------------------------------|
| <a href="#">mode (SONET), on page 856</a> | Sets the mode of an STS path, AU path, T3 controller, or TUG3 controller. |

 width



## T3, E3, T1, E1 Controller Commands on the Cisco ASR 9000 Series Router

---

This module provides command line interface (CLI) commands for configuring T3/E3 and T1/E1 controllers on the Cisco ASR 9000 Series Router.

- [bert e1, page 920](#)
- [bert e3, page 923](#)
- [bert error, page 925](#)
- [bert interval, page 927](#)
- [bert pattern, page 929](#)
- [bert t1, page 932](#)
- [bert t3, page 935](#)
- [cablelength, page 937](#)
- [channel-group, page 939](#)
- [clear controller lnm, page 941](#)
- [clear controller t1, page 944](#)
- [clear controller t3, page 946](#)
- [clock source \(T1/E1\), page 948](#)
- [clock source \(T3/E3\), page 950](#)
- [controller e1, page 952](#)
- [controller e3, page 954](#)
- [controller t1, page 956](#)
- [controller t3, page 958](#)
- [delay clear \(T1/E1\), page 960](#)
- [delay clear \(T3/E3\), page 962](#)
- [delay trigger \(T1/E1\), page 964](#)

- [delay trigger \(T3/E3\), page 966](#)
- [description \(T1/E1\), page 968](#)
- [description \(T3/E3\), page 970](#)
- [down-when-looped \(T1/E1\), page 972](#)
- [down-when-looped \(T3/E3\), page 974](#)
- [dsu bandwidth, page 976](#)
- [dsu mode, page 978](#)
- [dsu remote, page 980](#)
- [fdl, page 982](#)
- [framing \(E1\), page 984](#)
- [framing \(E3\), page 986](#)
- [framing \(T1\), page 988](#)
- [framing \(T3\), page 990](#)
- [linecode, page 992](#)
- [lnm major-warning, page 994](#)
- [lnm minor-warning, page 997](#)
- [lnm remove, page 1000](#)
- [lnm syslog, page 1003](#)
- [loopback \(T1/E1\), page 1005](#)
- [loopback \(T3/E3\), page 1007](#)
- [mdl, page 1009](#)
- [mode, page 1011](#)
- [national bits \(E1\), page 1013](#)
- [national bits \(E3\), page 1014](#)
- [show controllers e1, page 1016](#)
- [show controllers e3, page 1020](#)
- [show controllers lnm, page 1024](#)
- [show controllers t1, page 1028](#)
- [show controllers t3, page 1036](#)
- [shutdown \(T1/E1\), page 1045](#)
- [shutdown \(T3/E3\), page 1047](#)
- [speed \(DS0\), page 1049](#)
- [timeslots, page 1051](#)

- [yellow, page 1053](#)

# bert e1

To start or stop a configured bit error rate test (BERT) on an E1 controller or channel group, use the **bert e1** command in EXEC mode. To return to the default state, use the **no** form of this command.

**bert e1** *interface-path-id* [**channel-group** *channel-group-number*] [**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>channel-group</b><br><i>channel-group-number</i> | (Optional) Channel group number. When an E1 data line is configured, channel group numbers can be values from 0 to 30.<br><br><b>Note</b> For any of the DS0 time slots within the time slot range provided for the channel group, use time slot -1 as the channel number.      |
| <b>error</b>                                        | (Optional) Injects errors into the running BERT stream.                                                                                                                                                                                                                         |
| <b>start</b>                                        | Starts the BERT on the E1 controller or channel.                                                                                                                                                                                                                                |
| <b>stop</b>                                         | Stops the BERT on the E1 controller or channel.                                                                                                                                                                                                                                 |

## 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.

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 E1 controller or channel group, 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 E1 configuration mode and channel group configuration mode.

To view the BERT results, use the **show controllers e1** 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 E1 controller:

```
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 start
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an E1 controller:

```
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 error
```

**Related Commands**

| Command                                     | Description                                                                              |
|---------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">bert interval</a> , on page 927 | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line. |

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert pattern, on page 929</a>         | Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.                  |
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |

# 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 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 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/RSP0/CPU0:router# bert e3 0/3/0/0/0 start
RP/0/RSP0/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/RSP0/CPU0:router# bert e3 0/3/0/0 error
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert interval, on page 927</a>        | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.         |
| <a href="#">bert pattern, on page 929</a>         | Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.                  |
| <a href="#">show controllers e3, on page 1020</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 or T1/E1 line, use the **bert error** command in T3 or T1 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  
T1 configuration  
E1 configuration

## Command History

| Release       | Modification                                         |
|---------------|------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                         |
| Release 4.0.0 | Support for E3 and E1 configuration modes 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 **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/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert error 10
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert interval, on page 927</a>        | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.         |
| <a href="#">bert pattern, on page 929</a>         | Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.                  |
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |
| <a href="#">show controllers t3, on page 1036</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 or T1/E1 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  
T1 configuration  
E1 configuration  
Channel group configuration for T1 and E1

## Command History

| Release       | Modification                                        |
|---------------|-----------------------------------------------------|
| Release 3.9.0 | This command was introduced.                        |
| Release 4.0.0 | Support for E3 and E1 configuration mode 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 **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/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert interval 10
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert error, on page 925</a>           | Insert errors into a BERT stream on a T3/E3 or T1/E1 line.                                       |
| <a href="#">bert pattern, on page 929</a>         | Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.                  |
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |
| <a href="#">show controllers t3, on page 1036</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 or T1/E1 line or an individual channel group, use the **bert pattern** command in T3, E3, T1, E1, or channel group configuration mode. To disable a BERT pattern, use the **no** form of this command.

```
bert pattern {0s| 1in8| 1s| 2^11| 2^15| 2^20| 2^20-QRSS| 2^23| 2^9| 3in24| 55Daly| 55Octet| alt-0-1|
ds0-1| ds0-2| ds0-3| ds0-4}
```

```
no bert pattern {0s| 1in8| 1s| 2^11| 2^15| 2^20| 2^20-QRSS| 2^23| 2^9| 3in24| 55Daly| 55Octet| alt-0-1|
ds0-1| ds0-2| ds0-3| ds0-4}
```

### Syntax Description

|                  |                                                                                                                                                                                                                                                                              |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0s</b>        | Invokes a repeating pattern of zeros (...000...).                                                                                                                                                                                                                            |
| <b>1in8</b>      | (T1 and E1 only) Invokes a repeating pattern of one (1) bit in eight (8).                                                                                                                                                                                                    |
| <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) O.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 O.153 test pattern of 511 bits in length.                                                                                                                                                                                        |
| <b>3in24</b>     | (T1 and E1 only) Invokes a repeating pattern in which three (3) bits in twenty-four (24) are set to one (1) and the others are set to zero (0).                                                                                                                              |
| <b>55Daly</b>    | (T1 and E1 only) Invokes a repeating pattern of fifty-five (55) 8-bit octets of data. This pattern introduces rapid transitions from long sequences of low-density octets to high-density octets, high-density octets to low-density octets, and rapid 1010 bit transitions. |
| <b>55Octet</b>   | (T1 and E1 only) Invokes a repeating pattern of fifty-five (55) 8-bit octets of data. This pattern has fifteen (15) consecutive zeros.                                                                                                                                       |
| <b>alt-0-1</b>   | Invokes a repeating pattern of alternating zeros and ones (...01010...).                                                                                                                                                                                                     |
| <b>ds0-1</b>     | (Channel group only) Invokes a repeating sequence of 100x FFh, followed by 100x 00h. This combination of minimum and maximum densities causes stressing of the signal recovery circuitry.                                                                                    |

|              |                                                                                                                                                                              |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ds0-2</b> | (Channel group only) Invokes a repeating sequence of 100x 7Eh, followed by 100x 00h. This combination provides minimum ones density stressing as well as Layer 2 flag bytes. |
| <b>ds0-3</b> | (Channel group only) Invokes a repeating sequence of 200x 4Ch. This combination represents the typical SDD traffic patterns.                                                 |
| <b>ds0-4</b> | (Channel group only) Invokes a repeating sequence of 200x 40h. This combination represents the typical DEC VT traffic.                                                       |

**Command Default**

BERT pattern test is disabled

**Command Modes**

T3 configuration  
 E3 configuration  
 T1 configuration  
 E1 configuration  
 Channel group configuration for T1 and E1

**Command History**

| Release       | Modification                                                                                                                                                                                                  |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                                                                                                                                                                                  |
| Release 4.0.0 | <ul style="list-style-type: none"> <li>Support for E3 and E1 configuration mode was added.</li> <li>Support for the <b>ds0-1</b>, <b>ds0-2</b>, <b>ds0-3</b>, and <b>ds0-4</b> keywords was added.</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.

BERT is supported on each of the T3/E3 or T1/E1 links. It is done only over an unframed T3/E3 or T1/E1 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 t1**, **bert e1**, **bert t3**, or **bert e3** command in EXEC mode.

To view the BERT results, use the **show controllers t1** or **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/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert pattern 0s
```

### Related Commands

| Command                                            | Description                                                                                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert error</a> , on page 925           | Insert errors into a BERT stream on a T3/E3 or T1/E1 line.                                       |
| <a href="#">bert interval</a> , on page 927        | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.         |
| <a href="#">show controllers e1</a> , on page 1016 | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers e3</a> , on page 1020 | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t1</a> , on page 1028 | Displays information about the T1 links and hardware and software drivers for the T1 controller. |
| <a href="#">show controllers t3</a> , on page 1036 | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# bert t1

To start or stop a configured bit error rate test (BERT) on a T1 controller or channel group, use the **bert t1** command in EXEC mode.

**bert t1** *interface-path-id* [**channel-group** *channel-group-number*] [**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. For more information about the syntax for the router, use the question mark (?) online help function. |
| <b>channel-group</b><br><i>channel-group-number</i> | <b>Note</b> (Optional) Channel group number. When a T1 data line is configured, channel group numbers can be values from 0 to 23.                                                                                                                                            |
| <b>error</b>                                        | (Optional) Injects errors into the running BERT stream.                                                                                                                                                                                                                      |
| <b>start</b>                                        | Starts the BERT on the T1 controller or channel.                                                                                                                                                                                                                             |
| <b>stop</b>                                         | Stops the BERT on the T1 controller or channel.                                                                                                                                                                                                                              |

## 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.

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 T1 controller or channel group, 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 T1 configuration mode and channel group configuration mode.

To view the BERT results, use the **show controllers t1** 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 T1 controller:

```
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0/0 start
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an T1 controller:

```
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0 error
```

**Related Commands**

| Command                                                     | Description                                                                              |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <a href="#">bert interval</a> , <a href="#">on page 927</a> | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line. |
| <a href="#">bert pattern</a> , <a href="#">on page 929</a>  | Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.          |

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 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 3.9.0 | 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.

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/RSP0/CPU0:router# bert t3 0/3/0/0 start
RP/0/RSP0/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/RSP0/CPU0:router# bert t3 0/3/0/0 error
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">bert interval, on page 927</a>        | Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.         |
| <a href="#">bert pattern, on page 929</a>         | Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.                  |
| <a href="#">show controllers t3, on page 1036</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  
E3 configuration

## Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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 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.

## 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/RSP0/CPU0:router(config)# controller t3 0/6/0/0
```

**cablelength**

```
RP/0/RSP0/CPU0:router(config-t3)# cablelength 300
```

# channel-group

To configure a DS0 channel group and enter channel group configuration mode, use the **channel-group** command in T1 or E1 configuration mode. To unassign a channel group, use the **no** form of this command.

**channel-group** *channel-group-number*

**no channel-group** *channel-group-number*

## Syntax Description

| <i>channel-group-number</i> | <b>Note</b> | Channel group number. When a T1 controller is configured, channel group numbers can be values from 0 to 23. |
|-----------------------------|-------------|-------------------------------------------------------------------------------------------------------------|
|-----------------------------|-------------|-------------------------------------------------------------------------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

T1 configuration

E1 configuration

## Command History

| <b>Release</b> | <b>Modification</b>                                            |
|----------------|----------------------------------------------------------------|
| Release 3.9.0  | This command was introduced.                                   |
| Release 4.0.0  | Support for DS0 channel groups and E1 configuration 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.

The **channel-group** command is available only on channelized SPAs.

Use the **channel-group** command in configurations in which the router must communicate with a T1 or an E1 fractional data line. The channel group number may be arbitrarily assigned and must be unique for the controller. An associated serial interface is created with each defined channel group.

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

Use the **no channel group** command to delete a channel group.

## Task ID

| <b>Task ID</b> | <b>Operations</b> |
|----------------|-------------------|
| sonet-sdh      | read, write       |

**Examples**

The following example shows how to enter channel group configuration mode for channel group number 5 and change the speed of the underlying DS0s in the channel group to 56 kbps:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1-channel_group)# speed 56
```

The following example shows how to associate DS0 time slots 1, 6, 8, 9, and 10 to channel group 5:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1-channel_group)# timeslots 1:6:8-10
```

**Related Commands**

| Command                                   | Description                                                                                            |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <a href="#">bert pattern, on page 929</a> | Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.                        |
| <a href="#">framing (E1), on page 984</a> | Selects the frame type for an E1 data line.                                                            |
| <a href="#">framing (T1), on page 988</a> | Selects the frame type for a T1 data line.                                                             |
| <a href="#">mode, on page 1011</a>        | Sets the mode of the T3/E3 or T1/E1 controller.                                                        |
| <a href="#">speed (DS0), on page 1049</a> | Specifies the speed of the underlying DS0s in a channel group.                                         |
| <a href="#">timeslots, on page 1051</a>   | Associates one or more DS0 time slots to a channel group and create an associated serial subinterface. |

## clear controller lnm

To clear link noise monitoring statistics or reset states, use the **clear controller lnm** command in EXEC configuration mode.

**clear controller** {**t1**|**e1**} *interface-path-id* **lnm** {**state**|**statistics**}

### Syntax Description

|                          |                                                                                                                                                                                                                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t1</b>                | Specifies clearing of LNM states or statistics for a T1 controller.                                                                                                                                                                                                               |
| <b>e1</b>                | Specifies clearing of LNM states or statistics for an E1 controller.                                                                                                                                                                                                              |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><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. |
| <b>state</b>             | Resets the LNM event states for the specified controller.                                                                                                                                                                                                                         |
| <b>statistics</b>        | Clears the LNM statistics for the specified controller and resets them to zero.                                                                                                                                                                                                   |

### 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.

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack/slot/module/port/T3Num/T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.

- *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.
- *T1num*—T1 controller number.

There should not normally be any need to clear the LNM controller states. The **state** option resets the LNM configuration which causes an update of the current LNM states in the system. Therefore, under normal conditions, if the controller is in alarm state, the reset should continue to report the alarm state; alternatively, if the controller is clear of any alarms, the reset will show the stable state. The use of the **clear controller lnm state** command does not actually clear any alarms, but causes a refresh of their values in the system. Therefore, this command can be used if the reported controller state should happen to be out of synchronization with the actual controller state.

To view the status of the controllers, use the **show controllers t1** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| dwdm      | read, write |
| interface | read, write |
| sonet-sdh | read, write |

## Examples

The following example shows how to reset link noise monitoring states for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1 lnm state
```

The following example shows how to clear link noise monitoring statistics for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1 lnm statistics
```

## Related Commands

| Command                                        | Description                                                                                                                                                         |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">controller e1, on page 952</a>     | Configures an E1 controller and enters E1 configuration mode.                                                                                                       |
| <a href="#">controller t1, on page 956</a>     |                                                                                                                                                                     |
| <a href="#">lnm major-warning, on page 994</a> | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events. |

| Command                                            | Description                                                                                                                                                                    |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">lnm minor-warning, on page 997</a>     | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.            |
| <a href="#">lnm remove, on page 1000</a>           | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to PPP for removal of an MLPPP bundle link. |
| <a href="#">lnm syslog, on page 1003</a>           | Enables logging of link noise monitoring major, remove, and minor events and alarms.                                                                                           |
| <a href="#">show controllers e1, on page 1016</a>  | Displays information about the E1 links and hardware and software drivers for the E1 controller.                                                                               |
| <a href="#">show controllers lnm, on page 1024</a> | Displays information about LNM on T1 or E1 links.                                                                                                                              |
| <a href="#">show controllers t1, on page 1028</a>  | Displays information about the T1 links and hardware and software drivers for the T1 controller.                                                                               |

# clear controller t1

To clear T1 controller data, use the **clear controller t1** command in EXEC configuration mode.

**clear controller t1** *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 3.9.0 | 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 specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack/slot/module/port/T3Num/T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *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.
  - *T1num*—T1 controller number.



- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack/slot/module/port/vtg/vt*. 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 or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *vtg*—Virtual tributary group.
  - *vt*—Virtual tributary instance.

To view the status of the controllers, use the **show controllers t1** 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 the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1
```

#### Related Commands

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">controller t1, on page 956</a>        |                                                                                                  |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |

# 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

*interface-path-id*

Physical interface or virtual interface.

**Note** Use the **show controllers** 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

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.

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/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">controller t3, on page 958</a>        | Configures a T3 controller and enters T3 configuration mode.                                     |
| <a href="#">show controllers t3, on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## clock source (T1/E1)

To set clocking for individual T1 or E1 links, use the **clock source** command in T1 or E1 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 T1 or E1 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

T1 configuration  
E1 configuration

### Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E1 configuration mode 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  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to set the clocking on the T1 controller in slot 6, subslot 0 to internal:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1e1)# clock source internal
```

## Related Commands

| Command                                    | Description                                                   |
|--------------------------------------------|---------------------------------------------------------------|
| <a href="#">controller e1, on page 952</a> | Configures an E1 controller and enters E1 configuration mode. |
| <a href="#">controller t1, on page 956</a> |                                                               |

## 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 controller. The default is <b>internal</b> .                                                                                                                                                                                                              |
| <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 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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.

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 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/RSP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# clock source line
```

**Related Commands**

| Command                                    | Description                                                   |
|--------------------------------------------|---------------------------------------------------------------|
| <a href="#">controller e3, on page 954</a> | Configures an E3 controller and enters E3 configuration mode. |
| <a href="#">controller t3, on page 958</a> | Configures a T3 controller and enters T3 configuration mode.  |

# controller e1

To configure an E1 controller and enter E1 configuration mode, use the **controller e1** command in global configuration mode. To return to the default state, use the **no** form of this command.

**controller e1** *interface-path-id*

**no controller e1** *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 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 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 e1** command is used in configurations in which the router is intended to communicate with an E1 fractional data line. The **controller e1** command is available only on channelized interfaces.



Use the **mode** command in T3 configuration mode to specify the mode for the port. The default mode for 2-Port and 4-Port Channelized T3 SPAs is T1.

**Note**

If you do not use the **mode** command to define the port to be E1, you cannot configure the E1 controller.

To view the status of the controllers, use the **show controllers e1** command.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

The following example shows how to enter E1 configuration mode for a controller:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/1/0/0
RP/0/RSP0/CPU0:router(config-e1)#
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">mode, on page 1011</a>                | Sets the mode of the T3/E3 or T1/E1 controller.                                                  |
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |

## 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 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 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.

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/RSP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RSP0/CPU0:router(config-e3)#
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |

# controller t1

To configure a T1 controller and enter T1 configuration mode, use the **controller t1** command in global configuration mode. To return to the default state, use the **no** form of this command.

**controller t1** *interface-path-id*

**no controller t1** *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 3.9.0 | 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 specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack/slot/module/port/T3Num/T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *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.

- *T1num*—T1 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack/slot/module/port/vtg/vt*. 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 or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *vtg*—Virtual tributary group.
  - *vt*—Virtual tributary instance.

The **controller t1** command is used in configurations in which the router is intended to communicate with a T1 fractional data line. The **controller t1** command is available only on channelized SPAs.

Use the **mode** command in T3 configuration mode to specify the mode for each T3 port.

To view the status of the controllers, use the **show controllers t1** command.

If the T1 framing type is super frame (SF), you should consider disabling yellow alarm detection as the yellow alarm can be incorrectly detected with SF framing.

Serial interface may flap and eventually, go down if yellow alarm detection is not disabled on its T1 controller configured with SF framing.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

The following example shows how to enter T1 configuration mode for a controller:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-t1)#
```

## Related Commands

| Command                                            | Description                                                                                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">mode</a> , on page 1011                | Sets the mode of the T3/E3 or T1/E1 controller.                                                  |
| <a href="#">show controllers t1</a> , on page 1028 | Displays information about the T1 links and hardware and software drivers for the T1 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 3.9.0 | 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.

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.

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/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)#
```

### Related Commands

| Command                                                            | Description                                                                                      |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t3</a> , <a href="#">on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## delay clear (T1/E1)

To configure the amount of time before a T1 or E1 path delay trigger alarm is cleared, use the **delay clear** command in T1 or E1 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 T1 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

T1 configuration

E1 configuration

### Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E1 configuration mode 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  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to specify that T1 path delay trigger alarms should be cleared after 9000 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t1)#delay clear 9000
```



**Related Commands**

| Command                                             | Description                                                  |
|-----------------------------------------------------|--------------------------------------------------------------|
| <a href="#">delay trigger (T1/E1)</a> , on page 964 | Configures a time value for the T1 or E1 path delay trigger. |

## 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 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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  |
|-----------|-------------|
| 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/RSP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# delay clear 9000
```

**Related Commands**

| Command                                             | Description                                                  |
|-----------------------------------------------------|--------------------------------------------------------------|
| <a href="#">delay trigger (T3/E3)</a> , on page 966 | Configures a time value for the T3 or E3 path delay trigger. |

# delay trigger (T1/E1)

To configure a time value for the T1 or E1 path delay trigger, use the **delay trigger** command in T1 or E1 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 T1 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

T1 configuration

E1 configuration

## Command History

| Release       | Modification                            |
|---------------|-----------------------------------------|
| Release 3.9.0 | This command was introduced.            |
| Release 4.0.0 | Support for E1 configuration 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.

If the timer for the T1 or E1 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 T1 path delay trigger to 8000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# delay trigger 8000
```

**Related Commands**

| Command                                           | Description                                                                          |
|---------------------------------------------------|--------------------------------------------------------------------------------------|
| <a href="#">delay clear (T1/E1)</a> , on page 960 | Configures the amount of time before a T1 or E1 path delay trigger alarm is cleared. |

## 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 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 3.9.0 | This command was introduced.            |
| Release 4.0.0 | Support for E3 configuration 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.

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/RSP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# delay trigger 8000
```

**Related Commands**

| Command                                           | Description                                                                          |
|---------------------------------------------------|--------------------------------------------------------------------------------------|
| <a href="#">delay clear (T3/E3)</a> , on page 962 | Configures the amount of time before a T3 or E3 path delay trigger alarm is cleared. |

## description (T1/E1)

To configure a description for a T1 or E1 controller, use the **description** command in T1 or E1 configuration mode. To delete a T1 or E1 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

T1 configuration  
E1 configuration

### Command History

| Release       | Modification                            |
|---------------|-----------------------------------------|
| Release 3.9.0 | This command was introduced.            |
| Release 4.0.0 | Support for E1 configuration 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  |
|-----------|-------------|
| sonet-sdh | read, write |
| interface | read, write |

### Examples

The following example shows how to configure a description for a T1 controller:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/2/0
RP/0/RSP0/CPU0:router(config-t1)# description This is a sample description for T1 controller
0/6/2/0
```



**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |

## 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 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 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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  |
|-----------|-------------|
| sonet-sdh | read, write |
| interface | read, write |

### Examples

The following example shows how to configure a description for a T3 controller:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0
RP/0/RSP0/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 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## down-when-looped (T1/E1)

To configure a T1 or E1 controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in T1 or E1 configuration mode.

### down-when-looped

#### Syntax Description

This command has no keywords or arguments.

#### Command Default

By default, a T1 or E1 controller does not inform the system that it is down when loopback is detected.

#### Command Modes

T1 configuration  
E1 configuration

#### Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E1 configuration mode 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.

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 T1 controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t1)# down-when-looped
```

down-when-looped is a traffic-affecting operation if any loopback is present

**Related Commands**

| Command                                        | Description                                                          |
|------------------------------------------------|----------------------------------------------------------------------|
| <a href="#">loopback (T1/E1), on page 1005</a> | Loops individual T1 or E1 channels on the channelized 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 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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.

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/RSP0/CPU0:router(config)# controller t3 0/4/2/0
RP/0/RSP0/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 1007</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

E3 configuration

### Command History

| Release       | Modification                                 |
|---------------|----------------------------------------------|
| Release 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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.

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 59: 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 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/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# dsu bandwidth 16000
```

#### Related Commands

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1036</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 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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.

Refer to [Table 59: DSU Modes and Vendor-supported Bandwidths, on page 977](#) 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/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# dsu mode digital-link
```

### Related Commands

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1036</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 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E3 configuration mode 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 verify the DSU remote settings 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 specify that the connected remote port set its bandwidth to full rate:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0
```

```
RP/0/RSP0/CPU0:router(config-t3)# dsu remote fullrate
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t3, on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# fdl

To enable or disable the transmission of performance reports through Facility Data Link (FDL) for a T1 channel on the channelized T3 interface, use the **fdl** command in T1 configuration mode. To return to the default state of performance reporting, use the **no** form of this command.

**fdl** {ansi| att} {enable| disable}

**no fdl** {ansi| att} {enable| disable}

## Syntax Description

|                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| <b>ansi</b>    | Specifies the transmission of ANSI T1.403 once-per-second performance reports.      |
| <b>att</b>     | Specifies the transmission of AT&T TR54016 once-per-second performance reports.     |
| <b>enable</b>  | Enables transmission of the specified performance reports.                          |
| <b>disable</b> | Disables transmission of the specified performance reports. The default is disable. |

## Command Default

The transmission of ANSI T1.403 and AT&T TR54016 performance reports through FDL are disabled.

## Command Modes

T1 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 **fdl** command applies only to T1 lines and can be used only if the T1 framing type is Extended Super Frame (ESF).

To display the performance report information, use the **show controllers t1** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to enable ANSI T1.403 performance reports for T1 channel 10:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/1/10
RP/0/RSP0/CPU0:router(config-t1e1)# fdl ansi enable
```

## Related Commands

| Command                                                            | Description                                                                                      |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t1</a> , <a href="#">on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |

## framing (E1)

To select the frame type for an E1 data line, use the **framing** command in E1 configuration mode. To disable E1 framing, use the **no** form of this command.

**framing** {crc4| no-crc4| unframed}

**no framing** {crc4| no-crc4| unframed}

### Syntax Description

|                 |                                                                                          |
|-----------------|------------------------------------------------------------------------------------------|
| <b>crc4</b>     | Specifies framing with CRC-4 error-monitoring capabilities. The default is <b>crc4</b> . |
| <b>no-crc4</b>  | Specifies framing without CRC-4 error-monitoring capabilities.                           |
| <b>unframed</b> | Specifies unframed E1.                                                                   |

### Command Default

The default is **crc4**.

### Command Modes

E1 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.0.0 | This commnad was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task 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 in configurations in which the router or access server is intended to communicate with E1 fractional data lines. The service provider determines the framing type required for your E1 circuit.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to select E1 framing without CRC-4 error-monitoring capabilities:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# framing no-crc4
```



**Related Commands**

| Command                                            | Description                                                                                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e1</a> , on page 1016 | Displays information about the E1 links and hardware and software drivers for the E1 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 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.

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. You can also set the framing for each T1/E1 channel by using the **framing** command in T1 or E1 configuration mode.

### 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/RSP0/CPU0:router(config)# controller e3 0/6/0/0
RP/0/RSP0/CPU0:router(config-e3)# framing g751
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |

## framing (T1)

To select the frame type for a T1 data line, use the **framing** command in T1 configuration mode. To disable T1 framing, use the **no** form of this command.

**framing** {esf| sf}

**no framing** {esf| sf}

### Syntax Description

|            |                                                                                  |
|------------|----------------------------------------------------------------------------------|
| <b>esf</b> | Specifies extended super frame as the T1 frame type. The default is <b>esf</b> . |
| <b>sf</b>  | Specifies super frame as the T1 frame type.                                      |

### Command Default

The default is **esf**.

### Command Modes

T1 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.

Use the **framing** command in configurations in which the router or access server is intended to communicate with T1 fractional data lines. The service provider determines the framing type required for your T1 circuit.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to select super frame as the T1 frame type:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# framing sf
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 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** {c-bit| m23}

**no framing** {c-bit| m23}

### Syntax Description

|              |                                                                                            |
|--------------|--------------------------------------------------------------------------------------------|
| <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 3.9.0 | 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 use the **framing** command, the default is used by the T3 controllers to automatically determine the framing type received from the far-end equipment. You can also set the framing for each T1 or E1 channel by using the **framing** command in T1 or E1 configuration mode.

### 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/RSP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# framing m23
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t3, on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# linecode

To select the line-code type for T1 or E1 lines, use the **linecode** command in T1 or E1 configuration mode. To return the line to the default line-code type, use the **no** form of this command.

**linecode** {ami| b8zs| hdb3}

**no linecode** {ami| b8zs| hdb3}

## Syntax Description

|             |                                                                                                         |
|-------------|---------------------------------------------------------------------------------------------------------|
| <b>ami</b>  | Specifies alternate mark inversion (AMI) as the line-code type. This value is the default for E1 lines. |
| <b>b8zs</b> | (T1 only) Specifies B8ZS as the line-code type. This value is the default for T1 lines.                 |
| <b>hdb3</b> | (E1 only) Specifies high-density bipolar 3 (HDB3) as the line-code type.                                |

## Command Default

T1 lines: the default is B8ZS.

E1 lines: the default is AMI.

## Command Modes

T1 configuration

E1 configuration

## Command History

|               |                                              |
|---------------|----------------------------------------------|
| Release 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E1 configuration mode 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 this command in configurations where the router must communicate with T1 or E1 fractional data lines. The T1 or E1 service provider determines which line-code type is required for your T1 or E1 circuit.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |



## Examples

The following example shows how to select AMI as the T1 line-code type:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# linecode ami
```

The following example shows how to select HDB3 as the E1 line-code type:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/4/1/1
RP/0/RSP0/CPU0:router(config-e1)# linecode hdb3
```

## Related Commands

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |

## Inm major-warning

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events, use the **lnm major-warning** command in T1 or E1 controller configuration mode. To disable link noise monitoring major warnings, use the **no** form of this command.

**lnm major-warning** [{**clear**|**set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

**no lnm major-warning** [{**clear**|**set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

### Syntax Description

|                                             |                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>clear</b>                                | (Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a major warning has occurred and a “cleared” event is signalled. The clear threshold values cannot exceed the set threshold values.                                         |
| <b>set</b>                                  | (Optional) Specifies the high threshold values for LCV and PCV that are used to signal a major warning event on the link. When errors on the link are greater than or equal to these values, a major warning occurs and a “crossed” event is signalled.                                                                              |
| <b>line-code-violation</b> <i>lcv-value</i> | (Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: <ul style="list-style-type: none"> <li>• For T1 links, the range is 5 to 1544. The default is 1544.</li> <li>• For E1 links, the range is 7 to 2048. The default is 2048.</li> </ul> |
| <b>path-code-violation</b> <i>pcv-value</i> | (Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: <ul style="list-style-type: none"> <li>• For T1 links, the range is 3 to 320. The default is 320.</li> <li>• For E1 links, the range is 5 to 832. The default is 831.</li> </ul>                                             |
| <b>duration</b> <i>seconds</i>              | (Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the <b>set</b> threshold levels to signal a major warning, or remain below the <b>clear</b> threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.                         |

### Command Default

Link noise monitoring is disabled.

If the **lnm major-warning** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm major-warning** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm major-warning** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

### Command Modes

T1 configuration  
E1 configuration

### Command History

|               |                              |
|---------------|------------------------------|
| 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 can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The **lnm major-warning** command cannot be configured with the **lnm remove** command—they are mutually exclusive.

The major threshold values must be greater than the values configured in the **lnm minor-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

### Task ID

| Task ID   | Operation   |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to enable link noise monitoring on a T1 channel group using the default values for the set and clear threshold values of 1544 LCVs and 320 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm major-warning
```

The following example shows how to specify set and clear thresholds on an E1 channel group:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm major-warning set line-code-violation 1500
path-code-violation 100 duration 30
```

```
RP/0/RSP0/CPU0:router(config-e1)# lnm major-warning clear line-code-violation 1400
path-code-violation 95 duration 30
```

**Related Commands**

| Command                                            | Description                                                                                                                                                         |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">clear controller lnm, on page 941</a>  | Clears link noise monitoring statistics or resets states.                                                                                                           |
| <a href="#">controller e1, on page 952</a>         | Configures an E1 controller and enters E1 configuration mode.                                                                                                       |
| <a href="#">controller t1, on page 956</a>         |                                                                                                                                                                     |
| <a href="#">lnm minor-warning, on page 997</a>     | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events. |
| <a href="#">lnm syslog, on page 1003</a>           | Enables logging of link noise monitoring major, remove, and minor events and alarms.                                                                                |
| <a href="#">show controllers e1, on page 1016</a>  | Displays information about the E1 links and hardware and software drivers for the E1 controller.                                                                    |
| <a href="#">show controllers lnm, on page 1024</a> | Displays information about LNM on T1 or E1 links.                                                                                                                   |
| <a href="#">show controllers t1, on page 1028</a>  | Displays information about the T1 links and hardware and software drivers for the T1 controller.                                                                    |

## Inm minor-warning

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events, use the **Inm minor-warning** command in T1 or E1 controller configuration mode. To disable link noise monitoring minor warnings, use the **no** form of this command.

**Inm minor-warning** [{clear|set} [line-code-violation *lcv-value* [path-code-violation *pcv-value*]] [duration *seconds*]]

**no Inm minor-warning** [{clear|set} [line-code-violation *lcv-value* [path-code-violation *pcv-value*]] [duration *seconds*]]

### Syntax Description

|                                                |                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>clear</b>                                   | (Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a minor warning has occurred and a “cleared” event is signalled. The clear threshold values cannot exceed the set threshold values.                                       |
| <b>set</b>                                     | (Optional) Specifies the high threshold values for LCV and PCV that are used to signal a minor warning event on the link. When errors on the link are greater than or equal to these values, a minor warning occurs and a “crossed” event is signalled.                                                                            |
| <b>line-code-violation</b><br><i>lcv-value</i> | (Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: <ul style="list-style-type: none"> <li>• For T1 links, the range is 5 to 1544. The default is 154.</li> <li>• For E1 links, the range is 7 to 2048. The default is 205.</li> </ul> |
| <b>path-code-violation</b><br><i>pcv-value</i> | (Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: <ul style="list-style-type: none"> <li>• For T1 links, the range is 3 to 320. The default is 145.</li> <li>• For E1 links, the range is 5 to 832. The default is 205.</li> </ul>                                           |
| <b>duration</b> <i>seconds</i>                 | (Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the <b>set</b> threshold levels to signal a minor warning, or remain below the <b>clear</b> threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.                       |

### Command Default

Link noise monitoring is disabled.

If the **Inm minor-warning** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm minor-warning** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm minor-warning** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

### Command Modes

T1 configuration  
E1 configuration

### Command History

|               |                              |
|---------------|------------------------------|
| 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 can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The minor threshold values cannot be greater than the values configured in the **lnm major-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to enable link noise monitoring on a T1 channel group using the default values for the set and clear threshold values of 154 LCVs and 145 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm minor-warning
```

The following example shows how to specify set and clear thresholds on an E1 channel group:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm minor-warning set line-code-violation 200
path-code-violation 80 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm minor-warning clear line-code-violation 150
path-code-violation 75 duration 30
```

**Related Commands**

| Command                                            | Description                                                                                                                                                                    |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">clear controller lnm, on page 941</a>  | Clears link noise monitoring statistics or resets states.                                                                                                                      |
| <a href="#">controller e1, on page 952</a>         | Configures an E1 controller and enters E1 configuration mode.                                                                                                                  |
| <a href="#">controller t1, on page 956</a>         |                                                                                                                                                                                |
| <a href="#">lnm major-warning, on page 994</a>     | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.            |
| <a href="#">lnm remove, on page 1000</a>           | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to PPP for removal of an MLPPP bundle link. |
| <a href="#">lnm syslog, on page 1003</a>           | Enables logging of link noise monitoring major, remove, and minor events and alarms.                                                                                           |
| <a href="#">show controllers e1, on page 1016</a>  | Displays information about the E1 links and hardware and software drivers for the E1 controller.                                                                               |
| <a href="#">show controllers lnm, on page 1024</a> | Displays information about LNM on T1 or E1 links.                                                                                                                              |
| <a href="#">show controllers t1, on page 1028</a>  | Displays information about the T1 links and hardware and software drivers for the T1 controller.                                                                               |

# Inm remove

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to the Point-to-Point Protocol (PPP) for removal of a Multilink PPP (MLPPP) bundle link, use the **Inm remove** command in T1 or E1 controller configuration mode. To disable link removal signaling based on LNM thresholds, use the **no** form of this command.

**Inm remove** [{**clear**|**set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

**no Inm remove** [{**clear**|**set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

## Syntax Description

|                                             |                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>clear</b>                                | (Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a set threshold has occurred and a “cleared” event is signalled. The clear threshold values cannot exceed the set threshold values.                                         |
| <b>set</b>                                  | (Optional) Specifies the high threshold values for LCV and PCV that are used to signal the noise attribute to PPP on the link. When errors on the link are greater than or equal to these values, the noise attribute is set and a “crossed” event is signalled.                                                                     |
| <b>line-code-violation</b> <i>lcv-value</i> | (Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: <ul style="list-style-type: none"> <li>• For T1 links, the range is 5 to 1544. The default is 1544.</li> <li>• For E1 links, the range is 7 to 2048. The default is 2048.</li> </ul> |
| <b>path-code-violation</b> <i>pcv-value</i> | (Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: <ul style="list-style-type: none"> <li>• For T1 links, the range is 3 to 320. The default is 320.</li> <li>• For E1 links, the range is 5 to 832. The default is 831.</li> </ul>                                             |
| <b>duration</b> <i>seconds</i>              | (Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the <b>set</b> threshold levels to signal the noise attribute, or remain below the <b>clear</b> threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.                     |

## Command Default

Link noise monitoring is disabled.

If the **Inm remove** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **Inm remove** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **Inm remove** command is run and



only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

### Command Modes

T1 configuration

E1 configuration

### Command History

| Release       | Modification                 |
|---------------|------------------------------|
| Release 4.1.0 | This command was introduced. |

### Usage Guidelines

To use this command, you must be in a user group associated with a task 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 can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The **lnm remove** command cannot be configured with the **lnm major-warning** command—they are mutually exclusive.

The remove threshold values must be greater than the values configured in the **lnm minor-warning** command.

LNМ supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a remove threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

### Task ID

| Task ID   | Operation   |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to enable link noise monitoring to signal the noise attribute to PPP for link removal on a T1 channel group using the default values for the set and clear threshold values of 1544 LCVs and 320 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm remove
```

The following example shows how to specify set and clear thresholds for link noise monitoring on an E1 channel group to signal the noise attribute to PPP for link removal:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
```

```
RP/0/RSP0/CPU0:router(config-e1)# lnm remove set line-code-violation 1500 path-code-violation
100 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm remove clear line-code-violation 1400
path-code-violation 95 duration 30
```

**Related Commands**

| Command                                            | Description                                                                                                                                                         |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">clear controller lnm, on page 941</a>  | Clears link noise monitoring statistics or resets states.                                                                                                           |
| <a href="#">controller e1, on page 952</a>         | Configures an E1 controller and enters E1 configuration mode.                                                                                                       |
| <a href="#">controller t1, on page 956</a>         |                                                                                                                                                                     |
| <a href="#">lnm minor-warning, on page 997</a>     | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events. |
| <a href="#">lnm syslog, on page 1003</a>           | Enables logging of link noise monitoring major, remove, and minor events and alarms.                                                                                |
| <a href="#">show controllers e1, on page 1016</a>  | Displays information about the E1 links and hardware and software drivers for the E1 controller.                                                                    |
| <a href="#">show controllers lnm, on page 1024</a> | Displays information about LNM on T1 or E1 links.                                                                                                                   |
| <a href="#">show controllers t1, on page 1028</a>  | Displays information about the T1 links and hardware and software drivers for the T1 controller.                                                                    |

# lnm syslog

To enable logging of link noise monitoring major, remove, and minor events and alarms, use the **lnm syslog** command in T1 or E1 controller configuration mode. To disable logging, use the **no lnm syslog** command.

**lnm syslog**

**no lnm syslog**

## Syntax Description

This command has no keywords or arguments.

## Command Default

Logging of link noise monitoring messages and events is disabled.

## Command Modes

T1 configuration

E1 configuration

## Command History

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.



### Caution

Enabling LNM syslog messages can produce large amounts of console messages. If you want to avoid this and disable the LNM syslog, you can use the **show controllers lnm** command to view the most recent event messages and current LNM states.

When you enable syslog messages for LNM events using the **lnm syslog** command, LNM messages will appear in both the system log and in the log events buffer. You can display LNM events in the log events buffer using the **show logging events buffer bistate-alarms-set** command, and also using the **show logging** command, which are described in the *Cisco ASR 9000 Series Aggregation Services Router System Monitoring Command Reference*.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is continuously met or exceeded resulting in a crossed event and alarm state, then a minor warning alarm state is suppressed and returned to stable state. The minor crossed event also is removed from the bistate log. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Only a single crossed event for major warnings will appear in the bistate log for the controller. Therefore, you will see only a single log message for a controller if noise exists above configured threshold values.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

**Examples**

The following example shows how to enable logging of link noise monitoring events:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm syslog
```

```
Wed May 12 15:42:54.679 PDT
WARNING: Enabling 'lnm syslog' could result in large amount of messages depending on the
number of links configured.
```

**Related Commands**

| Command                                        | Description                                                                                                                                                         |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">controller e1, on page 952</a>     | Configures an E1 controller and enters E1 configuration mode.                                                                                                       |
| <a href="#">controller t1, on page 956</a>     | Configures a T1 controller and enters T1 configuration mode.                                                                                                        |
| <a href="#">lnm major-warning, on page 994</a> | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events. |
| <a href="#">lnm minor-warning, on page 997</a> | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events. |
| show logging                                   | Displays the contents of the logging buffer.                                                                                                                        |
| show logging events buffer                     | Displays messages in the logging events buffer.                                                                                                                     |

## loopback (T1/E1)

To loop individual T1 or E1 channels on the channelized T3 controller, use the **loopback** command in T1 or E1 configuration mode. To remove the loop, use the **no** form of this command.

```
loopback {local| network {line| payload}}| remote {line {fdl {ansi| bellcore}}| inband}| payload fdl ansi} }
no loopback {local| network {line| payload}}| remote {line {fdl {ansi| bellcore}}| inband}| payload fdl
ansi} }
```

### Syntax Description

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>local</b>                    | Loops the router output data back toward the router at the T1 framer and sends an alarm indication signal (AIS) signal out toward the network.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>network {line   payload}</b> | <p>T1 loopback with encapsulation HDLC:</p> <p>Loops the data back toward the network before the T1 framer and automatically sets a local loopback at the High-Level Data Link Control (HDLC) controllers (line), or loops the payload data back toward the network at the T1 framer and automatically sets a local loopback at the HDLC controllers (payload).</p> <p>T1 loopback with encapsulation PPP:</p> <p>Loops the data back toward the network before the T1 framer and automatically sets a local loopback at the PPP serial interface (line), or loops the payload data back toward the network at the T1 framer and automatically sets a local loopback at the PPP serial interface (payload).</p> |
| <b>remote line fdl</b>          | (T1 only) Sends a repeating, 16-bit Extended Superframe (ESF) data link code word (00001110 11111111 for FDL ANSI and 00010010 11111111 for FDL Bellcore) to the remote end, requesting that it enter into a network line loopback.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>remote line inband</b>       | (T1 only) Sends a repeating, 5-bit inband pattern (00001) to the remote end requesting that it enter into a network line loopback.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>remote payload fdl</b>       | (T1 only) Sends a repeating, 16-bit ESF data link code word (00010100 11111111) to the remote end, requesting that it enter into a network payload loopback. Enables the remote payload FDL ANSI bit loopback on the T1 channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>ansi</b>                     | (T1 only) Enables the remote line Facility Data Link (FDL) ANSI bit loopback on the T1 channel, based on the ANSI T1.403 specification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>bellcore</b>                 | (T1 only) Enables the remote SmartJack loopback on the T1 channel, based on the TR-TSY-000312 specification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

### Command Default

No loops are configured.

### Command Modes

T1 configuration

E1 configuration

### Command History

|               |                                              |
|---------------|----------------------------------------------|
| Release 3.9.0 | This command was introduced.                 |
| Release 4.0.0 | Support for E1 configuration mode 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 **loopback** command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **show controllers t1** or **show controllers e1** command in EXEC mode.

For E1 lines, only the **local** and **network** options are valid. For T1 lines, all listed options are valid.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to configure the T1 for a local loopback:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# loopback local
```

### Related Commands

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">framing (E1), on page 984</a>         | Selects the frame type for an E1 data line.                                                      |
| <a href="#">framing (T1), on page 988</a>         | Selects the frame type for a T1 data line.                                                       |
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |

## loopback (T3/E3)

To loop the entire T3 or E3 line (all 28 T1 channels or all 21 E1 channels) 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 3.9.0 | This command was introduced.            |
| Release 4.0.0 | Support for E3 configuration 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 **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.

You can also loopback each T1 or E1 channel by using the **loopback** command in T1 or E1 configuration 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/RSP0/CPU0:router(config)# controller t3 0/3/0/0
RP/0/RSP0/CPU0:router(config-t3)# loopback local
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">framing (E1), on page 984</a>         | Selects the frame type for an E1 data line.                                                      |
| <a href="#">framing (T1), on page 988</a>         | Selects the frame type for a T1 data line.                                                       |
| <a href="#">loopback (T1/E1), on page 1005</a>    | Loops individual T1 or E1 channels on the channelized T3 controller.                             |
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1036</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 3.9.0 | 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 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/RSP0/CPU0:router(config)# controller t3 0/1/2/0
RP/0/RSP0/CPU0:router(config-t3)# clock source line
RP/0/RSP0/CPU0:router(config-t3)# mdl string eic ID
RP/0/RSP0/CPU0:router(config-t3)# mdl string fic Building B
RP/0/RSP0/CPU0:router(config-t3)# mdl string unit ABC
RP/0/RSP0/CPU0:router(config-t3)# mdl string fi Facility Z
RP/0/RSP0/CPU0:router(config-t3)# mdl string port-number Port 7
RP/0/RSP0/CPU0:router(config-t3)# mdl transmit path enable
RP/0/RSP0/CPU0:router(config-t3)# mdl transmit idle-signal enable
```

**Related Commands**

| Command                                            | Description                                                                                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers t3</a> , on page 1036 | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

# mode

To set the mode of the T3/E3 or T1/E1 controller, use the **mode** command in T3, E3, T1, or E1 configuration mode. To disable the controller mode, use the **no** form of this command.

**mode** {e1| serial| t1}

**no mode** {e1| serial| t1}

## Syntax Description

|               |                                                                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>e1</b>     | (T3 and E3 only) Specifies the mode of the port to be channelized E1.                                                                                 |
| <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. |
| <b>t1</b>     | (T3 and E3 only) Specifies the mode of the port to be channelized T1.                                                                                 |

## Command Default

There is no default for the 2-Port Channelized OC-12/DS0 SPA.

## Command Modes

T3 configuration  
E3 configuration  
T1 configuration  
E1 configuration

## Command History

| Release       | Modification                                         |
|---------------|------------------------------------------------------|
| Release 3.9.0 | This command was introduced.                         |
| Release 4.0.0 | Support for E3 and E1 configuration modes 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 can change the mode of a controller only when there are no subinterfaces defined for the controller. For example, if you previously defined channelized T1 subinterfaces on a T3 interface and now you want to change this to E1 subinterfaces or a clear channel interface, you must first clear the subinterfaces. To do this, use the **no controller t1** command for all defined T1/E1 subinterfaces. If you have defined serial parameters, you also need to use the **no interface serial** command.

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 channelized T1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# mode t1
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |
| <a href="#">show controllers t3, on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |

## national bits (E1)

To specify the national reserved bits for an E1 port, use the **national bits** command in E1 configuration mode. To revert to the default national bits, use the **no** form of this command.

**national bits** *bits*

**no national bits** *bits*

### Syntax Description

|             |                                                            |
|-------------|------------------------------------------------------------|
| <i>bits</i> | Bit pattern. Values can be from 0 to 31. The default is 0. |
|-------------|------------------------------------------------------------|

### Command Default

The default is 0, which corresponds to 0x1f.

### Command Modes

E1 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.

### Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to specify the national bits for the E1 controller:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# national bits 3
```

### Related Commands

| Command                                                            | Description                                                                                      |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e1</a> , <a href="#">on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 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 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  |
|-----------|-------------|
| sonet-sdh | read, write |

### Examples

The following example shows how to enable the national bits for an E3 controller:

```
RP/0/RSP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RSP0/CPU0:router(config-e3)# national bits enable
```

**Related Commands**

| Command                                            | Description                                                                                      |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3</a> , on page 1020 | Displays information about the E3 links and hardware and software drivers for the E3 controller. |

# show controllers e1

To display information about the E1 links and hardware and software drivers for the E1 controller, use the **show controllers e1** command in EXEC mode.

**show controllers e1** *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 E1 bit error rate test results.                                                                                                                                                                                                                               |
| <b>brief</b>             | Displays summary information for the E1 controller.                                                                                                                                                                                                                             |
| <b>internal-state</b>    | Displays internal E1 state information.                                                                                                                                                                                                                                         |
| <b>tabular</b>           | Displays E1 controller information in tabular format.                                                                                                                                                                                                                           |

## 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.

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 e1** command for a single E1 channel:

```
RP/0/RSP0/CPU0:router# show controllers e1 0/1/0/0
```

```
E1 0/1/0/0 is down
timeslots:
Receiver has no alarms.
Framing is E1 CRC, Clock Source is internal
Data in current interval (0 seconds elapsed):
 0 Line Code Violations, 0 Path Code Violations
 0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
 0 Unavail Secs, 0 Stuffed Secs
 0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
```

**Table 60: show controllers e1 Field Descriptions**

| Field                  | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E1 0/1/0/0 is down     | E1 channel is not operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).                                                                                                                                                                                                                                                        |
| timeslots              | DS0 time slots assigned to the E1 channel.                                                                                                                                                                                                                                                                                                                                                                               |
| Receiver has no alarms | Any alarms detected by the E1 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> |

| Field                  | Description                                                                                                                                                                                                                                                      |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Framing                | Framing type on the channelized controller.                                                                                                                                                                                                                      |
| Clock Source           | Clock source controller. Values are internal and line.                                                                                                                                                                                                           |
| 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. |
| Slip Secs              | Controlled slip second (CSS) is a 1-second interval that contains one or more controlled slips.                                                                                                                                                                  |
| Fr Loss Secs           | Frame loss seconds (SELS) is the number of seconds for which an out-of-frame error is detected.                                                                                                                                                                  |
| Line Err Secs          | Line errored seconds (LES) is a second in which one or more line code violation errors are detected.                                                                                                                                                             |
| Degraded Mins          | Degraded minute (DM) is a minute in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, see RFC 1406, <i>Definitions of Managed Objects for DS1 and E1 Interface Types</i> .                                             |
| Errored Secs           | Errored seconds (ES) is a second with one or more path coding violations, one or more out-of-frame defects, or one or more controlled slip events or a detected AIS defect.                                                                                      |
| Bursty Err Secs        | Bursty errored seconds (BES) is a second with fewer than 320 and more than one path coding violation error events, no severely errored frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.                 |
| Severely Err Secs      | Severely errored seconds (SES) is a second with 320 or more path code violation errors events, one or more out-of-frame defects, or a detected AIS defect.                                                                                                       |
| Unavailable Secs       | Number of seconds during which the interface was not available in this interval, referred to as UAS.                                                                                                                                                             |

| Field                  | Description                                                                                                                                                                                                                                                                                                                                                         |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stuffed Secs           | Stuffed seconds (SS) is a second in which one more bit stuffings take place. This happens when the Pulse Density Enforcer detects a potential violation in the output stream and inserts a 1 to prevent it. Such bit stuffings corrupt user data and indicate that the network is configured incorrectly. This counter can be used to help diagnose this situation. |
| Near-end path failures | Path failure (PFC)                                                                                                                                                                                                                                                                                                                                                  |
| Far-end path failures  | (PFCFE)                                                                                                                                                                                                                                                                                                                                                             |
| SEF/AIS Secs           | (SAS)                                                                                                                                                                                                                                                                                                                                                               |

**Related Commands**

| Command                                     | Description                                                   |
|---------------------------------------------|---------------------------------------------------------------|
| <a href="#">controller e1</a> , on page 952 | Configures an E1 controller and enters E1 configuration mode. |

# 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 4.0.0 | This command was introduced on the . |

## Usage Guidelines

To use this command, you must be in a user group associated with a task 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/RSP0/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/RSP0/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 61: 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 954</a> | Configures an E3 controller and enters E3 configuration mode. |

# show controllers lnm

To display information about link noise monitoring (LNM) on T1 or E1 links, use the **show controllers lnm** command in EXEC configuration mode.

**show controllers** {**t1**|**e1**} *interface-path-id* **lnm** [**all**|**configuration**|**event**|**statistics**]

## Syntax Description

|                          |                                                                                                                                                                                                                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t1</b>                | Displays LNM information for a T1 controller.                                                                                                                                                                                                                                     |
| <b>e1</b>                | Displays LNM information for an E1 controller.                                                                                                                                                                                                                                    |
| <i>interface-path-id</i> | Physical interface or virtual interface.<br><br><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. |
| <b>all</b>               | (Optional) Displays LNM configuration, state, statistics, and event information.                                                                                                                                                                                                  |
| <b>configuration</b>     | (Optional) Displays LNM configuration and state information. This is the default.                                                                                                                                                                                                 |
| <b>event</b>             | (Optional) Displays LNM information about the last 5 events.                                                                                                                                                                                                                      |
| <b>statistics</b>        | (Optional) Displays LNM statistics.                                                                                                                                                                                                                                               |

## 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.

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack/slot/module/port/T3Num/T1num*.
- The slash between values is required as part of the notation.



- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *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.
  - *T1num*—T1 controller number.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| sonet-sdh | read       |

**Examples**

The following example shows sample output from the **show controllers t1 lnm** command with the **all** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm all
Thu May 13 10:28:26.474 PDT
Controller T1 0/1/1/0/1/1
Syslog Monitoring type State Thresholds (lcv/pcv/duration)

enabled minor-warning stable Set(15/ 15/ 4) Clear(15/ 15/ 4)
 major-warning stable Set(154/ 145/ 4) Clear(154/ 145/ 4)

Monitoring type Minor-Warn Major-Warn

Create 1 1
Update 0 0
Delete 0 0
Clear 0 0
Noise Crossed 1 1
Noise Cleared 1 1

Last Five Events

MINWARNCROSS: Noise crossed minor-warn threshold at Thu May 13 09:54:10 2010
MAJWARNCROSS: Noise crossed major-warn threshold at Thu May 13 09:54:11 2010
MAJWARNCLEAR: Noise cleared major-warn threshold at Thu May 13 10:27:25 2010
MINWARNCLEAR: Noise cleared minor-warn threshold at Thu May 13 10:28:14 2010
```

The following example shows sample output from the **show controllers t1 lnm** command with the **configuration** keyword for a single T1 channel:

**Note**

This is also the default output that is displayed if you run the **show controllers lnm** command without specifying any keyword options.

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm configuration
Thu May 13 10:28:26.474 PDT
Controller T1 0/1/1/0/1/1
Syslog Monitoring type State Thresholds (lcv/pcv/duration)

enabled minor-warning stable Set(15/ 15/ 4) Clear(15/ 15/ 4)
 major-warning stable Set(154/ 145/ 4) Clear(154/ 145/ 4)
```

The following example shows sample output from the **show controllers t1 lnm** command with the **event** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm event
Thu May 13 10:28:26.474 PDT
Controller T1 0/1/1/0/1/1
Last Five Events

MINWARNCROSS: Noise crossed minor-warn threshold at Thu May 13 09:54:10 2010
MAJWARNCROSS: Noise crossed major-warn threshold at Thu May 13 09:54:11 2010
MAJWARNCLEAR: Noise cleared major-warn threshold at Thu May 13 10:27:25 2010
MINWARNCLEAR: Noise cleared minor-warn threshold at Thu May 13 10:28:14 2010
```

The following example shows sample output from the **show controllers t1 lnm** command with the **statistics** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm statistics
Thu May 13 10:28:26.474 PDT
Controller T1 0/1/1/0/1/1
Monitoring type Minor-Warn Major-Warn

Create 1 1
Update 0 0
Delete 0 0
Clear 0 0
Noise Crossed 1 1
Noise Cleared 1 1
```

**Related Commands**

| Command                                           | Description                                                                                                                                                         |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">clear controller lnm, on page 941</a> | Clears link noise monitoring states or statistics.                                                                                                                  |
| <a href="#">lnm major-warning, on page 994</a>    | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events. |

| Command                                         | Description                                                                                                                                                         |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">lnm minor-warning</a> , on page 997 | Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events. |
| show logging                                    | Displays the contents of the logging buffer.                                                                                                                        |
| show logging events buffer                      | Displays messages in the logging events buffer.                                                                                                                     |

# show controllers t1

To display information about the T1 links and hardware and software drivers for the T1 controller, use the **show controllers t1** command in EXEC mode.

**show controllers t1** *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **remote** {**performance brief** | **tabular**} | **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. 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 T1 bit error rate test results.                                                                                                                                                                                                                            |
| <b>brief</b>                                                | Displays summary information for the T1 controller.                                                                                                                                                                                                                          |
| <b>internal-state</b>                                       | Displays internal T1 state information.                                                                                                                                                                                                                                      |
| <b>remote</b> { <b>performance brief</b>   <b>tabular</b> } | Displays remote performance information in a brief summary or table format.                                                                                                                                                                                                  |
| <b>tabular</b>                                              | Displays T1 controller information in table format.                                                                                                                                                                                                                          |

## 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.

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack/slot/module/port/T3Num/T1num*.

- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *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.
  - *T1num*—T1 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack/slot/module/port/vtg/vt*. 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 or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *vtg*—Virtual tributary group.
  - *vt*—Virtual tributary instance.

**Task ID**

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

**Examples**

The following example shows sample output from the **show controllers t1** command with the **brief** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1 brief

T1 0/4/2/0/1 is up
mode: ATM
timeslots: 1-24
FDL per AT&T 54016 spec.
Receiver has no alarms.
Framing is ESF, Line Code is B8ZS, Clock Source is internal
Alarm Soaking Interval:
 Alarm Declaring= 2500 msec
 Alarm clearing = 10000 msec

Bert Test on controller port : T1 0/4/2/0/1
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 62: show controllers t1 brief Field Descriptions**

| Field                          | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T1 0/4/2/0/1 is up             | T1 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).                                                                                                                                                                                                                                                            |
| mode                           | Mode of the T1 controller, which can be ATM.                                                                                                                                                                                                                                                                                                                                                                             |
| timeslots                      | DS0 time slots assigned to the T1 channel.                                                                                                                                                                                                                                                                                                                                                                               |
| FDL per <i>spec-name</i> spec. | Performance monitoring is through Facility Data Link based on ANSI T1.403 specification or AT&T standard specification number 54016.                                                                                                                                                                                                                                                                                     |
| Receiver has no alarms.        | Any alarms detected by the T1 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 channelized controller. Values are ESF and SF.                                                                                                                                                                                                                                                                                                                                                       |
| Line Code                      | Line coding format on the channelized controller. Values are AMI or B8ZS.                                                                                                                                                                                                                                                                                                                                                |
| Clock Source                   | Clock source on the T1 channel. Values are internal and line.                                                                                                                                                                                                                                                                                                                                                            |

| Field                              | Description                                                                                                                                                                                                                                                                        |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm Soaking Interval             | Values of the following alarm soaking intervals: <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 on controller port       | Indicates controller port on which BERT test can be run.                                                                                                                                                                                                                           |
| BERT test result                   | Indicates the current state of the test. Can be one of the following: <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.                                                                                                                                                                                                                              |
| 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. <p><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.</p>                   |
| 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 t1** command for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1

T1 0/4/2/0/1 is up
mode: ATM
timeslots: 1-24
FDL per AT&T 54016 spec.
Receiver has no alarms.
Framing is ESF, Line Code is B8ZS, Clock Source is internal
Data in current interval (38 seconds elapsed):
 0 Line Code Violations, 0 Path Code Violations
 0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
 0 Unavail Secs, 0 Stuffed Secs
 0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
Data in Interval 1:
 0 Line Code Violations, 0 Path Code Violations
 0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
 0 Unavail Secs, 0 Stuffed Secs
 0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
Data in Interval 2:
 0 Line Code Violations, 0 Path Code Violations
 0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
 0 Unavail Secs, 0 Stuffed Secs
 0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
.
.
.
```

The following example shows sample output from the **show controllers t1** command with the **tabular** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1 tabular

T1 0/4/2/0/1 is up
mode: ATM
timeslots: 1-24
FDL per AT&T 54016 spec.
Receiver has no alarms.
Framing is ESF, Line Code is B8ZS, Clock Source is internal
INTERVAL LCV PCV CSS SEFS LES DM ES BES SES UAS SSS
08:30-08:35 0 0 0 0 0 0 0 0 0 0 0
08:15-08:30 0 0 0 0 0 0 0 0 0 0 0
08:00-08:15 0 0 0 0 0 0 0 0 0 0 0
07:45-08:00 0 0 0 0 0 0 0 0 0 0 0
07:30-07:45 0 0 0 0 0 0 0 0 0 0 0
07:15-07:30 0 0 0 0 0 0 0 0 0 0 0
07:00-07:15 0 0 0 0 0 0 0 0 0 0 0
06:45-07:00 0 0 0 0 0 0 0 0 0 0 0
06:30-06:45 0 0 0 0 0 0 0 0 0 0 0
06:15-06:30 0 0 0 0 0 0 0 0 0 0 0
06:00-06:15 0 0 0 0 0 0 0 0 0 0 0
05:45-06:00 0 0 0 0 0 0 0 0 0 0 0
05:30-05:45 0 0 0 0 0 0 0 0 0 0 0
05:15-05:30 0 0 0 0 0 0 0 0 0 0 0
.
.
.
```



**Table 63: show controllers t1 and show controllers t1 tabular Field Descriptions**

| Field                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T1 0/4/2/0/1 is up                         | T1 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).                                                                                                                                                                                                                                                            |
| mode                                       | Mode of the T1 controller, which can be ATM.                                                                                                                                                                                                                                                                                                                                                                             |
| timeslots                                  | DS0 time slots assigned to the T1 channel.                                                                                                                                                                                                                                                                                                                                                                               |
| FDL per <i>spec-name</i> spec.             | Performance monitoring is through Facility Data Link based on ANSI T1.403 specification or AT&T standard specification number 54016.                                                                                                                                                                                                                                                                                     |
| Receiver has no alarms.                    | Any alarms detected by the T1 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 channelized controller. Values are ESF and SF.                                                                                                                                                                                                                                                                                                                                                       |
| Line Code                                  | Line coding format on the channelized controller. Values are AMI or B8ZS.                                                                                                                                                                                                                                                                                                                                                |
| Clock Source                               | Clock source on the T1 channel. 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.                                                                                                                                                                                               |

| Field                  | Description                                                                                                                                                                                                                                                                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slip Secs              | Controlled slip second (CSS) is a 1-second interval that contains one or more controlled slips.                                                                                                                                                                                                                                                                      |
| Fr Loss Secs           | Frame loss seconds (SELS) is the number of seconds for which an out-of-frame error is detected.                                                                                                                                                                                                                                                                      |
| Line Err Secs          | Line errored seconds (LES) is a second in which one or more line code violation errors are detected.                                                                                                                                                                                                                                                                 |
| Degraded Mins          | Degraded minute (DM) is a minute in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, see RFC 1406, <i>Definitions of Managed Objects for DS1 and E1 Interface Types</i> .                                                                                                                                                 |
| Errored Secs           | Errored seconds (ES) is a second with one or more path coding violations, one or more out-of-frame defects, or one or more controlled slip events or a detected AIS defect.                                                                                                                                                                                          |
| Bursty Err Secs        | Bursty errored seconds (BES) is a second with fewer than 320 and more than one path coding violation error events, no severely errored frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.                                                                                                                     |
| Severely Err Secs      | Severely errored seconds (SES) is a second with 320 or more path code violation errors events, one or more out-of-frame defects, or a detected AIS defect.                                                                                                                                                                                                           |
| Unavailable Secs       | Number of seconds during which the interface was not available in this interval, referred to as UAS.                                                                                                                                                                                                                                                                 |
| Stuffed Secs           | Stuffed seconds (SSS) is a second in which one more bit stuffings take place. This happens when the Pulse Density Enforcer detects a potential violation in the output stream and inserts a 1 to prevent it. Such bit stuffings corrupt user data and indicate that the network is configured incorrectly. This counter can be used to help diagnose this situation. |
| Near-end path failures | Total number of near-end path failures.                                                                                                                                                                                                                                                                                                                              |
| Far-end path failures  | Total number of far-end path failures.                                                                                                                                                                                                                                                                                                                               |
| SEF/AIS Secs           | Total number or Severely Errored Framing (SEF) and Alarm Indication Signal (AIS) errors.                                                                                                                                                                                                                                                                             |

**Related Commands**

| Command                                     | Description |
|---------------------------------------------|-------------|
| <a href="#">controller t1</a> , on page 956 |             |

# 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 3.9.0 | 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.

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/RSP0/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 64: 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/RSP0/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/RSP0/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 65: 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 958 | Configures a T3 controller and enters T3 configuration mode. |

## shutdown (T1/E1)

To disable the T1 or E1 controller, use the **shutdown** command in T1 or E1 configuration mode. To restart a disabled T1 or E1 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** T1 configuration  
E1 configuration

| Command History | Release       | Modification                                 |
|-----------------|---------------|----------------------------------------------|
|                 | Release 3.9.0 | This command was introduced.                 |
|                 | Release 4.0.0 | Support for E1 configuration mode 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.

Shutting down the T1 or E1 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 t1** or **show controllers e1** command.

| Task ID | 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/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# no shutdown
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e1, on page 1016</a> | Displays information about the E1 links and hardware and software drivers for the E1 controller. |
| <a href="#">show controllers t1, on page 1028</a> | Displays information about the T1 links and hardware and software drivers for the T1 controller. |

## 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

| Command History | Release       | Modification                                 |
|-----------------|---------------|----------------------------------------------|
|                 | Release 3.9.0 | This command was introduced.                 |
|                 | Release 4.0.0 | Support for E3 configuration mode 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.

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 | 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/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# no shutdown
```

**Related Commands**

| Command                                           | Description                                                                                      |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers e3, on page 1020</a> | Displays information about the E3 links and hardware and software drivers for the E3 controller. |
| <a href="#">show controllers t3, on page 1036</a> | Displays information about the T3 links and hardware and software drivers for the T3 controller. |



## speed (DS0)

To specify the speed of the underlying DS0s in a channel group, use the **speed** command in channel group configuration mode. To revert to the default speed, use the **no** form of this command.

**speed** *kbps*

**no speed** *kbps*

| Syntax Description | <i>kbps</i> | Speed of the underlying DS0s in kilobits per second (kbps). Valid values are 56 and 64. The default is 64 kbps. |
|--------------------|-------------|-----------------------------------------------------------------------------------------------------------------|
|--------------------|-------------|-----------------------------------------------------------------------------------------------------------------|

| Command Default | The default speed is 64 kbps. |
|-----------------|-------------------------------|
|-----------------|-------------------------------|

| Command Modes | Channel group configuration for T1 |
|---------------|------------------------------------|
|---------------|------------------------------------|

| 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>Before the channel group configuration is valid, you must define the associated DS0 time slots using the <b>timeslots</b> command.</p> |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Task ID | Task ID   | Operations  |
|---------|-----------|-------------|
|         | sonet-sdh | read, write |

| Examples | The following example shows how to define the speed for the underlying DS0 to be 56 kbps: |
|----------|-------------------------------------------------------------------------------------------|
|----------|-------------------------------------------------------------------------------------------|

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1el)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1el-channel_group)# speed 56
```

**Related Commands**

| Command                                    | Description                                                                                            |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <a href="#">timeslots, on page 1051</a>    | Associates one or more DS0 time slots to a channel group and create an associated serial subinterface. |
| <a href="#">channel-group, on page 939</a> | Configures a DS0 channel group and enters channel group configuration mode.                            |

# timeslots

To associate one or more DS0 time slots to a channel group and create an associated serial subinterface, use the **timeslots** command in channel group configuration mode. To unassign the DS0 time slots and delete the associated serial interface, use the **no** form of this command.

**timeslots** *range*

**no timeslots**

## Syntax Description

*range*

## Command Default

No default behavior or values

## Command Modes

Channel group configuration for T1 and E1

## 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 time slot range must match the DS0 time slots assigned to the channel group. The service provider defines the DS0 time slots that compose a channel group.

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to associate DS0 time slots 1, 6, 8, 9 and 10 to channel group 5:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# timeslots 1:6:8-10
```

The following example shows configuration of the full 24 timeslots on the 2-Port Channelized OC-12/DS0 SPA, which is required when configuring link noise monitoring:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# timeslots 1-24
```

## Related Commands

| Command                                    | Description                                                                 |
|--------------------------------------------|-----------------------------------------------------------------------------|
| <a href="#">framing (E1), on page 984</a>  | Selects the frame type for an E1 data line.                                 |
| <a href="#">framing (T1), on page 988</a>  | Selects the frame type for a T1 data line.                                  |
| <a href="#">speed (DS0), on page 1049</a>  | Specifies the speed of the underlying DS0s in a channel group.              |
| <a href="#">channel-group, on page 939</a> | Configures a DS0 channel group and enters channel group configuration mode. |

# yellow

To enable detection and generation of T1 yellow alarms, use the **yellow** command in T1 configuration mode. To disable detection and generation of T1 yellow alarms, use the **no** form of this command.

**yellow** {**detection**| **generation**} {**disable**| **enable**}

**no yellow** {**detection**| **generation**} {**disable**| **enable**}

## Syntax Description

|                   |                                                                             |
|-------------------|-----------------------------------------------------------------------------|
| <b>detection</b>  | Detects yellow alarms.                                                      |
| <b>generation</b> | Generates yellow alarms.                                                    |
| <b>disable</b>    | Disables detection or generation of T1 yellow alarms.                       |
| <b>enable</b>     | Enables detection or generation of T1 yellow alarms. The default is enable. |

## Command Default

Yellow alarms are detected and generated on the T1 channel.

## Command Modes

T1 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 the T1 framing type is super frame (SF), you should consider disabling yellow alarm detection as the yellow alarm can be incorrectly detected with SF framing.

Serial interface may flap and eventually, go down if yellow alarm detection is not disabled on its T1 controller configured with SF framing.

The default state of the **yellow** command is enabled. If you disable yellow alarm detection and want to reenable it, you can use the **no** form of the command. Alternatively, you can use the **enable** keyword.

The **yellow** command is only applicable to T1 lines.

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| sonet-sdh | read, write |

## Examples

The following example shows how to disable yellow alarm generation:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# yellow generation disable
```



# Traffic Mirroring Commands on the Cisco ASR 9000 Series Router

---

This module describes the commands used to configure and monitor traffic mirroring.

- [acl, page 1056](#)
- [clear monitor-session counters, page 1058](#)
- [destination interface, page 1060](#)
- [destination pseudowire, page 1062](#)
- [mirror first, page 1063](#)
- [monitor-session, page 1064](#)
- [monitor-session \(interface\), page 1065](#)
- [show monitor-session status, page 1067](#)
- [show monitor-session counters, page 1069](#)

# acl

To configure ACL-based traffic mirroring, use the **acl** command in monitor session configuration mode. To stop ACL-based traffic mirroring, use the **no** form of this command.

**acl**

| Syntax Description | This command has no keywords or arguments.                                                                                        |         |              |               |                              |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------|--------------|---------------|------------------------------|
| Command Default    | No default behavior or values                                                                                                     |         |              |               |                              |
| Command Modes      | Monitor session configuration                                                                                                     |         |              |               |                              |
| Command History    | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>Release 4.0.0</td><td>This command was introduced.</td></tr></table> | Release | Modification | Release 4.0.0 | This command was introduced. |
| 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.

If you use the **acl** command, traffic is mirrored according to the definition of the global interface access list (ACL) defined in one of the following commands: **ipv4 access-list**, **ipv6 access-list**, **ethernet-services access-list**.

Even when the **acl** command is configured on the source mirroring port, if the ACL configuration command does not use the **capture** keyword, no traffic gets mirrored.

If the ACL configuration uses the **capture** keyword, but the **acl** command is not configured on the source port, although traffic is mirrored, no access list configuration is applied.

**Examples** This example shows how to configure ACL-based traffic mirroring on the interface:

```
RP/0/RSP0/CPU0:router(config)# monitor-session tm_example
RP/0/RSP0/CPU0:router(config)# ethernet-services access-list tm_filter
RP/0/RSP0/CPU0:router(config-es-acl)# 10 deny 0000.1234.5678 0000.abcd.abcd any capture
RP/0/RSP0/CPU0:router(config-es-acl)# exit
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet0/2/0/0
RP/0/RSP0/CPU0:router(config-if)# monitor-session tm_example direction rx-only
RP/0/RSP0/CPU0:router(config-if)# acl
RP/0/RSP0/CPU0:router(config-if)# l2transport
RP/0/RSP0/CPU0:router(config-if-l2)# exit
RP/0/RSP0/CPU0:router(config-if)# ethernet-services access-group tm_filter ingress
RP/0/RSP0/CPU0:router(config-if)# end
```



**Related Commands**

| Command                       | Description                                                 |
|-------------------------------|-------------------------------------------------------------|
| ethernet-services access-list | Defines an Ethernet services (Layer 2) access list by name. |
| ipv4 access-list              | Defines an IPv4 access list by name.                        |
| ipv6 access-list              | Defines an IPv6 access list by name.                        |

# clear monitor-session counters

To clear the traffic mirroring session statistics, use the **clear monitor-session counters** command in EXEC mode.

**clear monitor-session counters** [**interface** *type interface-path-id*]

Syntax Description

|                          |                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>interface</b>         | Identifies the interface for which the counters are to be cleared.                                                                                                                                                                                                          |
| <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><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>session-name</i>      | Name of the monitor session to clear.                                                                                                                                                                                                                                       |

Command Default

All stored statistics for all interfaces are cleared.

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.

Task ID

| Task ID   | Operations |
|-----------|------------|
| interface | read       |

## Examples

This example shows how to clear the traffic mirroring statistic counters:

```
RP/0/RSP0/CPU0:router#clear monitor-session counters
```

# destination interface

To associate a destination interface with a traffic mirroring session, use the **destination interface** command in monitor session configuration mode. To remove the designated destination, use the **no** form of this command.

**destination interface** *type interface-path-id*

**no destination 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

Monitor sessions configuration

## 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.

Use the **destination interface** command to assign a traffic monitoring session to a specific destination interface. This is the port to which a network analyzer is connected. This is generally called the monitoring port.

A destination port has these characteristics:

- A destination port must reside on the same switch as the source port.
- A destination port can be any Ethernet physical port or EFP, but not a bundle interface.
- At any one time a destination port can participate in only one traffic mirroring session. A destination port in one traffic mirroring session cannot be a destination port for a second traffic mirroring session. In other words, no two monitor sessions can have the same destination port.
- A destination port cannot also be a source port.

## Examples

The following example shows how to configure a monitoring port for a traffic mirroring session:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)# destination interface gigabitethernet0/0/0/15
```

# destination pseudowire

To direct mirrored traffic to a pseudowire, use the **destination pseudowire** command in monitor session configuration mode. To remove the pseudowire designation, use the **no** form of this command.

**destination pseudowire**

**no destination pseudowire**

**Syntax Description** This command has no keywords or arguments.

**Command Default** No default behavior or values

**Command Modes** Monitor session 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 **destination pseudowire** command to direct the mirrored traffic to a pseudowire. A network analyzer in a central location can then be used to monitor the traffic. Use the [monitor-session \(l2vpn\)](#) command to define the exact pseudowire to which the monitored traffic should be replicated.

**Examples** The following example shows how to configure a monitoring port for a traffic mirroring session:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)# destination pseudowire
```

| Related Commands | Command                                 | Description                                                                       |
|------------------|-----------------------------------------|-----------------------------------------------------------------------------------|
|                  | <a href="#">monitor-session (l2vpn)</a> | Attaches a traffic monitoring session as one of the segments for a cross connect. |

# mirror first

To configure partial traffic mirroring, use the **mirror first** command in monitor session configuration mode. To stop mirroring a portion of the packet, use the **no** form of this command.

**mirror first** *bytes*

## Syntax Description

|              |                                                                                      |
|--------------|--------------------------------------------------------------------------------------|
| <i>bytes</i> | Number of bytes mirrored. The mirrored packet length value can range from 65 to 128. |
|--------------|--------------------------------------------------------------------------------------|

## Command Default

The entire packet is mirrored.

## Command Modes

Monitor session 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 **mirror first** command to mirror the first 64 to 128 bytes of the packet. The actual mirrored packet is the configured partial packet monitoring size plus the 4-byte trailing CRC.

## Examples

This example shows how to mirror the first 100 bytes of the packet:

```
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet0/0/0/11
RP/0/RSP0/CPU0:router(config-if)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-if-mon)# mirror first 100
```

## Related Commands

| Command                                       | Description                                                                       |
|-----------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">monitor-session, on page 1064</a> | Defines a traffic mirroring session and enter monitor session configuration mode. |

# monitor-session

To define a traffic mirroring session and enter monitor session configuration mode, use the **monitor-session** command in global configuration mode. To remove the traffic mirroring session, use the **no** form of this command.

**monitor-session** *session-name*

**no monitor-session** *session-name*

## Syntax Description

|                     |                                           |
|---------------------|-------------------------------------------|
| <i>session-name</i> | Name of the monitor session to configure. |
|---------------------|-------------------------------------------|

## Command Default

No default behavior or values

## Command Modes

Global configuration

## 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.

Before you can assign a monitor session to a specific interface, you must configure it using the **monitor-session** command. The *session-name* should not be the same as any interface name.

In monitor session configuration mode, you should define the destination interface to be used in the traffic mirroring session using the **destination** command.

## Examples

This example shows how to enter monitor session configuration mode:

```
RP/0/RSP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)#
```

## Related Commands

| Command                                              | Description                                                          |
|------------------------------------------------------|----------------------------------------------------------------------|
| <a href="#">destination interface</a> , on page 1060 | Associates a destination interface with a traffic mirroring session. |



## monitor-session (interface)

To associate a traffic mirroring session with a specific interface, use the **monitor-session** command in interface configuration mode. To remove the association between a traffic mirroring session and an interface, use the **no** form of this command.

**monitor-session** *session-name* [**direction** {**rx-only**| **tx-only**}]

**no monitor-session** *session-name* [**direction** {**rx-only**| **tx-only**}]

### Syntax Description

|                     |                                                              |
|---------------------|--------------------------------------------------------------|
| <i>session-name</i> | Name of the monitor session to configure.                    |
| <b>direction</b>    | Specifies that traffic replication is in only one direction. |
| <b>rx-only</b>      | Specifies that only ingress traffic is replicated.           |
| <b>tx-only</b>      | Specifies that only egress traffic is replicated.            |

### Command Default

Replicates both ingress and egress traffic.

### Command Modes

Interface configuration

### Command History

| Release       | Modification                                                |
|---------------|-------------------------------------------------------------|
| Release 3.9.1 | This command was introduced.                                |
| Release 4.0.0 | The <b>acl</b> and <b>mirror first</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.

Before you can associate a traffic mirroring session to a specific interface, you must define it using the **monitor-session** global configuration command. After the traffic mirroring session is defined, use the **monitor-session** interface configuration command to associate this session with a specific source interface. When the session is associated, all specified traffic on the interface is then replicated to the destination location defined in the monitor session configuration.

The **monitor-session** interface configuration command also enters monitor session configuration mode for you to configure additional features of the mirroring session.

**Task ID**

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

**Examples**

This example shows how to enter monitor session configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet0/0/0/11
RP/0/RSP0/CPU0:router(config-if)# l2transport
RP/0/RSP0/CPU0:router(config-if-l2)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-if-mon)#
```

**Related Commands**

| Command                                       | Description                                                                       |
|-----------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">monitor-session, on page 1064</a> | Defines a traffic mirroring session and enter monitor session configuration mode. |

# show monitor-session status

To display status information about configured traffic mirroring sessions, use the **show monitor-session status** command in EXEC mode.

**show monitor-session** [ *session-name* ] **status** [**detail**] [**errors**]

## Syntax Description

|                     |                                                                                                                                                   |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>session-name</i> | Name of the monitor session to configure.                                                                                                         |
| <b>detail</b>       | Displays the full error string for any errors.                                                                                                    |
| <b>errors</b>       | Displays all sessions, but only source interfaces with errors are displayed (if no source interfaces have errors, then 'No errors' is displayed). |

## Command Default

No default behavior or values

## 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.

The **show monitor-sessions status** command displays the following information:

- Destination information for the session (including the name of the interface).
- Destination status (interface state).
- List of source interfaces.
- Any other status information that may be pertinent, such as a software or hardware error that would stop sessions operating correctly. If an error is returned from interactions with another component, then the full error string is only displayed in detail output; standard tabular output reports that there has been an error but refers the user to the detailed output.

## Examples

This example shows sample output from the **show monitor-session status** command:

```
RP/0/RSP0/CPU0:router# show monitor-session status
```

show monitor-session status

```
Monitor-session foo
Destination interface GigabitEthernet 0/0/0/0
=====
Source Interface Dir Status

Gi0/1/0/0.10 Both Operational
Gi0/1/0/0.11 Rx Operational
Gi0/1/0/0.12 Tx Operational
```

# show monitor-session counters

To display statistics regarding traffic mirroring sessions, use the **show monitor-session counters** command in EXEC mode.

**show monitor-session** [ *session-name* ] **counters**

| Syntax Description |                                                               |
|--------------------|---------------------------------------------------------------|
|                    | <i>session-name</i> Name of the monitor session to configure. |

|                        |                               |
|------------------------|-------------------------------|
| <b>Command Default</b> | No default behavior or values |
|------------------------|-------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | 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.

The **show monitor-sessions counters** command displays a list of all source interfaces, and the replicated packet statistics for each interface. The full set of statistics displayed for each interface is:

- Ingress replicated packets and octets
- Egress replicated packets and octets
- Non-replicated packets and octets

**Examples**

This example shows sample output from the **show monitor-session counters** command:

```
RP/0/RSP0/CPU0:router show monitor-session 2 counters
Monitor session 2
GigabitEthernet 0/3/0/0.100:
 Rx Replicated: 100 Packets 8000 Bytes
 Tx Replicated: 2 Packets 3000 Bytes
 Non Replicated: 0 Packets 0 Bytes
```

**show monitor-session counters**



# VLAN Subinterface Commands on the Cisco ASR 9000 Series Router

---

This module provides command line interface (CLI) commands for configuring IEEE 802.1Q VLANs on the Cisco ASR 9000 Series Router.

- [dot1q vlan](#), page 1072
- [interface \(VLAN\)](#), page 1074

# 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.



## Note

Effective with Cisco IOS XR Release 3.7.2, the **dot1q vlan** command is replaced by the **encapsulation dot1q** command. See the **encapsulation dot1q** command for more information.

**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 3.7.2 | This command was introduced and was also replaced by the <b>encapsulation dot1q</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 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.

**Note**

The **dot1q vlan** command is replaced by the **encapsulation dot1q** command. It is still available for backward-compatibility, but only for Layer 3 interfaces. The **encapsulation dot1q** command must be used going forward.

**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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RSP0/CPU0:router(config-subif)# dot1q vlan 10
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1 12transport
RP/0/RSP0/CPU0:router(config-subif)# dot1q vlan 10 any
```

**Related Commands**

| Command                                                       | Description                                                                             |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <a href="#">dot1q native vlan</a>                             | Assigns the native VLAN ID of a physical interface trunking 802.1Q VLAN traffic.        |
| <a href="#">show interfaces</a> , <a href="#">on page 490</a> | Displays statistics for all interfaces configured on the router or for a specific node. |

# 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 3.7.2 | 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 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/RSP0/CPU0:router(config)# interface TenGigE 0/0/0/1.2
RP/0/RSP0/CPU0:router(config-subif)# dot1q vlan 1
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface GigabitEthernet 0/4/0/1.1
RP/0/RSP0/CPU0:router(config-if-l2)#
```

**Related Commands**

| Command                                  | Description                                                                                                 |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <a href="#">dot1q native vlan</a>        | Assigns the native VLAN ID of a physical interface trunking 802.1Q VLAN traffic.                            |
| <a href="#">dot1q vlan, on page 1072</a> | Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface). |

 interface (VLAN)



## 10-Gigabit Ethernet WAN PHY Controller Commands on the Cisco ASR 9000 Series Router

---

This module describes the commands to configure a 10-Gigabit Ethernet WAN PHY physical controller on the Cisco ASR 9000 Series Router.

For information on 10-Gigabit Ethernet (GE) interface commands see the *Ethernet Interface Commands on the Cisco ASR 9000 Series Router* module.

- [clear controller wanphy, page 1078](#)
- [clear counters wanphy, page 1080](#)
- [controller wanphy, page 1082](#)
- [show controllers wanphy, page 1084](#)
- [transport-mode, page 1094](#)

# 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 3.9.0 | 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, execute |

## Examples

This example shows how to configure a 10-Gigabit Ethernet WAN PHY controller in Slot 6:

```
RP/0/RSP0/CPU0:router # clear controller wanphy 0/6/0/0 stats
```

## Related Commands

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1084</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |
| <a href="#">clear counters wanphy, on page 1080</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 3.9.0 | 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, execute |



## Examples

The following example shows how to clear the alarms counters for a 10-Gigabit Ethernet WAN interface:

```
RP/0/RSP0/CPU0:router # clear counters wanphy 0/6/0/0 stats
```

## Related Commands

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1084</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |
| <a href="#">clear controller wanphy, on page 1078</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 3.9.0 | 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

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/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config) # controller wanphy 0/6/0/0
RP/0/RSP0/CPU0:router(config-wanphy) #
```

**Related Commands**

| Command                                               | Description                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">show controllers wanphy, on page 1084</a> | Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller. |

# 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 3.9.0 | 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       |

**Examples**

The following example shows sample output from the **show controllers wanphy** command with the **all** keyword:

```
RP/0/RSP0/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, FEAISP = 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
Curent Alarms: 0x8
```

**Table 66: 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>• FEAISP—Number of Far End - AIS - Path (FEAISP) 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 (LFEBI) 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_FEBE—Total number of Far End Block Errors (FEBEs) 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/RSP0/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 66: show controllers wanphy Command Output Fields](#), on page 1086.

The following example shows sample output from the **show controllers wanphy** command with the **registers** keyword:

```
RP/0/RSP0/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 66: show controllers wanphy Command Output Fields, on page 1086](#).

#### Related Commands

| Command                                               | Description                                                                       |
|-------------------------------------------------------|-----------------------------------------------------------------------------------|
| <a href="#">clear controller wanphy, on page 1078</a> | Clears the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller. |

## transport-mode

To specify the transport mode for a 10-Gigabit Ethernet interface, use the **transport-mode** command in interface configuration mode. To return to the default mode, use the **no** form of this command.

**transport-mode** {wan|otn bit-transparent {opu1e| opu2e}}

**no transport-mode** {wan|otn bit-transparent {opu1e| opu2e}}

### Syntax Description

|                            |                                                                                                                                               |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>wan</b>                 | Configures the interface for 10GBASE-W WAN SONET/SDH (9.95328Gb/s) transport.                                                                 |
| <b>otn bit-transparent</b> | Configures the interface for 10-Gigabit Ethernet over Optical Transport Network (ITU-T G.709) with 10GBASE-R transparently mapped into OTU-2. |
| <b>opu1e</b>               | Configures the interface for 10GBASE-R over OPU1e without fixed stuffing (11.0491Gb/s).                                                       |
| <b>opu2e</b>               | Configures the interface for 10GBASE-R over OPU2e with fixed stuffing (11.0957Gb/s)                                                           |

### Command Default

The interface is in LAN mode. Neither WAN mode or OTN mode is configured.

### 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.

Three modes are supported for a 10-Gigabit Ethernet interface: LAN, WAN, or OTN on these Ethernet line cards and Modular Port Adaptors (MPAs):

- 2-Port 10-Gigabit Ethernet, 20-Port Gigabit Ethernet Combination line card (A9K-2T20GE-B and A9K-2T20GE-L)
- 8-Port 10-Gigabit Ethernet line card (A9K-8T-L, -B, or -E)
- 16-Port 10-Gigabit Ethernet SFP+ line card (A9K-16T/8-B and A9K-16T/8-B+AIP)
- 24-Port 10-Gigabit Ethernet line card (A9K-24X10GE-SE/TR)

- 36-Port 10-Gigabit Ethernet line card (A9K-36X10GE-SE/TR)
- 2-Port 10-Gigabit Ethernet Modular Port Adaptor (A9K-MPA-2x10GE)
- 4-Port 10-Gigabit Ethernet Modular Port Adaptor (A9K-MPA-4x10GE)
- 8-Port 10-Gigabit Ethernet Modular Port Adaptor (A9K-MPA-8x10GE)

If you want to configure the interface for DWDM support, configure the 10-Gigabit Ethernet interface for OTN transport mode.

The following 40GE MPAs support LAN and OTU3 modes:

- A9K-MPA-1x40GE
- A9K-MPA-2x40GE

## Task ID

| Task ID   | Operations  |
|-----------|-------------|
| interface | read, write |

## Examples

This example shows how to configure the interface for WAN PHY mode:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface 10gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# transport-mode wan
RP/0/RSP0/CPU0:router(config-if)# commit
```

The following configuration is needed to operate in WAN PHY mode:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller wanphy <>
RP/0/RSP0/CPU0:router(config)# wanmode on
RP/0/RSP0/CPU0:router(config)# commit
```

This example shows how to configure a DWDM interface using OTN transport:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface 10gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# transport-mode otn bit-transparent opule
RP/0/RSP0/CPU0:router(config-if)# commit
```

The following additional configuration is also needed:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm <>
RP/0/RSP0/CPU0:router(config)# admin-state in-service
RP/0/RSP0/CPU0:router(config)# commit
```

This example shows how to return the interface configuration to its default LAN mode from OTN or WAN PHY mode:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface 10gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# no transport-mode
RP/0/RSP0/CPU0:router(config-if)# commit
```

**Related Commands**

| Command                                          | Description                                                                                                            |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <a href="#">controller wanphy</a> , on page 1082 | Enters WAN physical controller configuration mode in which you can configure a 10-Gigabit Ethernet WAN PHY controller. |





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