Interface and Hardware Component Command Reference, Cisco IOS XE Release 3SE (Catalyst 3850 Switches)

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cable bundle through clock mode

channel-group

To configure serial WAN on a T1 or E1 interface, use the **channel-group** command in controller configuration mode. To clear a channel group, use the **no** form of this command.

Cisco 2600 Series

channel-group *channel-group-number* **timeslots** *range* [**speed** {**56**| **64**}] [**aim** *aim-slot-number*]

no channel-group *channel-group-number*

Cisco 2611 (Cisco Signaling Link Terminal [SLT])

channel-group *channel-number*

no channel-group *channel-number*

Cisco 2600XM Series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745

channel-group *channel-group-number* {**timeslots** *range* [**speed** {**56**| **64**}]| **unframed**} [**aim** *aim-slot-number*]

no channel-group [*channel-group-number* **timeslots** *range*]

Cisco AS5350 and Cisco AS5400 Series

channel-group *channel-group-number*

no channel-group *channel-group-number*

Cisco MC3810

channel-group *channel-number* **timeslots** *range* [**speed** {**56**| **64**}]

no channel-group [*channel-number* **timeslots** *range*]

Syntax Description

channel-group-number	Channel-group number on the Cisco 2600 series, Cisco 2600XM, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745 routers. When a T1 data line is configured, channel-group numbers can be values from 0 to 23. When an E1 data line is configured, channel-group numbers can be values from 0 to 30. Valid values can be 0 or 1 on the Cisco AS5350 and Cisco AS5400.

timeslots *range*	Specifies one or more time slots separated by commas, and spaces or ranges of time slots belonging to the channel group separated by a dash. The first time slot is numbered 1. • For a T1 controller, the time slots range from 1 to 24. • For an E1 controller, the time slots range from 1 to 31. You can specify a time slot range (for example, 1-29), individual time slots separated by commas (for example 1, 3, 5), or a combination of the two (for example 1-14, 15, 17-31). See the "Examples" section for samples of different timeslot ranges.
speed {**56**|**64**}	(Optional) Specifies the speed of the underlying DS0s in kilobits per second. Valid values are 56 and 64. The default line speed when configuring a T1 controller is 56 kbps on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and Cisco MC3810. The default line speed when configuring an E1 controller is 64 kbps on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and Cisco MC3810. The line speed controls real-time (VBR-RT) traffic shaping, and the maximum burst size (MBS) is 255 cells.
aim *aim-slot-number*	(Optional) Directs HDLC traffic from the T1/E1 interface to the AIM-ATM-VOICE-30 digital signaling processor (DSP) card on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745.
channel-number	Number of the channel. Valid values can be 0 or 1 on the Cisco SLT (Cisco 2611).
unframed	Specifies the use of all 32 time slots for data. None of the 32 time slots is used for framing signals on the Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745. This keyword is applicable to E1 only.

Command Default The T1/E1 line is connected to the Motorola MPC-860x processor serial communication controller (SCC) or network module with two voice or WAN interface card (VIC or WIC) slots and 0/1/2 FastEthernet ports

DSCC4 by default on Cisco 2600 series, Cisco 2600XM, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745 routers.

There is no default behavior or values on the Cisco SLT (Cisco 2611).

The serial interface object encapsulation is set to HDLC on a network access server (NAS) (Cisco AS5350 and Cisco AS5400 series routers).

The default line speed is 56 kbps when a T1 controller is configured on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and the Cisco MC3810.

The default line speed is 64 kbps when an E1 controller is configured on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and the Cisco MC3810.

Command Modes

Controller configuration (config-controller)

Command History

Release	Modification
11.3MA	This command was introduced on the Cisco MC3810.
12.0	This command was integrated into Cisco IOS Release 12.0 on the Cisco MC3810.
12.0(7)XE	This command was implemented on the Catalyst 6000 family switches.
12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.
12.1(1)T	This command was modified to accommodate two channel groups on a port on 1- and 2-port T1/E1 multiflex voice or WAN interface cards on the Cisco 2600 and Cisco 3600 series routers.
12.1(3a)E3	The number of valid values for the *kbps*argument was changed on the Cisco MC3810; see the "Usage Guidelines" section for valid values.
12.2(11)T	This command was implemented on the Cisco AS5350 and Cisco AS5400.
12.2(15)T	The **aim** keyword was added for use on the Cisco 2600 series (including the Cisco 2691), Cisco 2600XM, Cisco 3660, Cisco 3725, and Cisco 3745.
12.3(1)	The **unframed** keyword was added for use on the Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use this command to direct HDLC traffic from the T1/E1 interface to the AIM-ATM-VOICE-30 DSP card. A channel group is created using Advanced Integration Module (AIM) HDLC resources when a **channel-group** command with the **aim** keyword is parsed during system initialization or when the command is entered during configuration. You must specify the **aim** keyword under a T1/E1 controller port to direct HDLC traffic from

the T1/E1 interface to the AIM-ATM-VOICE-30 DSP card on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745.

Note Neither the Cisco AS5400 series NAS nor the Cisco MC3810 is supported with the integrated voice and data WAN on T1/E1 interfaces using the AIM-ATM-VOICE-30 module.

If previous **channel-group** commands are configured with the **aim** keyword, subsequent **channel-group** commands without the **aim** keyword are rejected. Similarly, if a regular **channel-group** command is followed by another **channel-group** command with the **aim** keyword implemented, the second command is rejected on the Cisco 2600 and Cisco 2600XM.

A channel group using AIM HDLC resources is deleted only when a **nochannel-group** command is entered.

By default, the**channel-group** command on a NAS sets the serial interface object encapsulation to HDLC. You must override the default by entering the **encapsulationss7** command for that serial interface object. Once you override the default, encapsulation cannot be changed again for that object. The SS7 encapsulation option is new to the Integrated Signaling Link Terminal feature and is available only for interface serial objects created by the**channel-group** command. The Integrated Signaling Link Terminal feature added SLT functionality on Cisco AS5350 and Cisco AS5400 platforms.

A digital SS7 link can be deleted by entering the **nochannel-group***channel-group-number* command on the associated T1/E1 controller. The link must first be stopped using the **noshutdown** command. It is not necessary to remove the channel ID association first.

Use the **channel-group** command in configurations where the router or access server must communicate with a T1 or E1 fractional data line. The channel group number may be arbitrarily assigned and must be unique for the controller. The time-slot range must match the time slots assigned to the channel group. The service provider defines the time slots that comprise a channel group.

Note Channel groups, channel-associated signaling (CAS) voice groups, DS0 groups, and time-division multiplexing (TDM) groups all use group numbers. All group numbers configured for channel groups, CAS voice groups, and TDM groups must be unique on the local Cisco MC3810 concentrator. For example, you cannot use the same group number for a channel group and for a TDM group. Furthermore, on the Cisco MC3810, only one channel group can be configured on a controller.

The channel group number can be 0 or 1 on the Cisco SLT (Cisco 2611).

The **channel-group** command also applies to Voice over Frame Relay, Voice over ATM, and Voice over HDLC on the Cisco MC3810.

Examples

The following example shows basic configuration directing HDLC traffic from the T1/E1 interface to the AIM-ATM-VOICE-30 DSP card, starting in global configuration mode:

```
Router(config)# controller e1 1/0
Router(config-controller)# clock source internal
Router(config-controller)# channel-group 0 timeslots 1-31 aim 0
```

The following example explicitly sets the encapsulation type to PPP to override the HDLC default:

```
Router# configure terminal
Router(config)# controller t1 6/0
Router(config-controller)# channel-group 2 timeslots 3 aim 0
Router(config-controller)# exit
```

```
Router(config)# interface serial 6/0:2
Router(config-if)# encapsulation ppp
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# end
```

The following example shows how to explicitly set the encapsulation type to SS7 to override the HDLC default using the Integrated Signaling Link Terminal feature. This example uses an 8PRI DFC card inserted into slot 7, and DS0-timeslot 3 on trunk 5 of that card is used as an SS7 link:

```
Router# configure terminal
Router(config)# controller t1 7/5
Router(config-controller)# channel-group 2 timeslots 3
Router(config-controller)# exit
Router(config)# interface serial 7/5:2
Router(config-if)# encapsulation ss7
Router(config-if)# channel-id 0
Router(config-if)# no shutdown
Router(config-if)# end
```

The following example defines three channel groups. Channel-group 0 consists of a single time slot, channel-group 8 consists of seven time slots and runs at a speed of 64 kbps per time slot, and channel-group 12 consists of two time slots.

```
Router(config-controller)# channel-group 0 timeslots 1
Router(config-controller)# channel-group 8 timeslots 5,7,12-15,20 speed 64
Router(config-controller)# channel-group 12 timeslots 2
```

The following example configures a channel group on controller T1 0 on a Cisco MC3810:

```
Router(config)# controller T1 0
Router(config-controller)# channel-group 10 timeslots 10-64
```

The following example configures a channel group on controller E1 1 and specifies that all time slots are used for data:

```
controller e1 1
channel-group 1 unframed
```

Note SS7 digital F-link support for the 8PRI line card requires use of a third onboard TDM stream to route trunk DS0 messages to the onboard MGCs.

Related Commands

Command	Description
framing	Specifies the frame type for the T1 or E1 data line.
invert data	Enables channel inversion.
linecode	Specifies the line code type for the T1 or E1 line.
voice-card	Configures a card with voice processing resources and enters voice card configuration mode.
encapsulation	Sets the encapsulation type.

channel-group (interface)

To assign and configure an EtherChannel interface to an EtherChannel group, use the **channel-group** command in interface configuration mode. To remove the channel-group configuration from the interface, use the **no** form of this command.

channel-group *channel-group-number* **mode** {**active**| **on**| **passive**}

no channel-group *channel-group-number*

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

channel-group *channel-group-number* **mode on**

no channel-group *channel-group-number*

Cisco ASR 1000 Series Routers

channel-group *channel-group-number* **mode** {**active**| **passive**}

no channel-group

Cisco Catalyst Switches

channel-group *channel-group-number* **mode** {**active**| **on**| **auto [non-silent]**| **desirable [non-silent]**| **passive**}

no channel-group *channel-group-number*

Syntax Description

channel-group-number	Integer that identifies the channel-group. Valid values are from 1 to 256; the maximum number of integers that can be used is 64. • For Fast EtherChannel groups, the number is an integer from 1 to 4. This number is the one previously assigned to the port-channel interface. • On the Cisco ASR 1000 series router, valid values are from 1 to 64.
mode	Specifies the EtherChannel mode of the interface.
active	Enables Link Aggregation Control Protocol (LACP) unconditionally.
on	Enables EtherChannel only.
auto	Places a port into a passive negotiating state in which the port responds to Port Aggregation Protocol (PAgP) packets that it receives but does not initiate PAgP packet negotiation.

non-silent	(Optional) Used with the **auto** or **desirable** mode when traffic is expected from the other device.
desirable	Places a port into an active negotiating state in which the port initiates negotiations with other ports by sending PAgP packets.
passive	Enables LACP only when an LACP device is detected. This is the default state.

Command Default

No channel groups are assigned.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
11.1CA	This command was introduced.
12.0(7)XE	Support for this command was implemented on Cisco Catalyst 6000 series switches.
12.1(3a)E3	The number of valid values for the *number*argumentwas changed; see the "Usage Guidelines" section for valid values.
12.2(2)XT	This command was implemented on the Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(8)T	Support for this command was implemented on the Cisco 2600 series, the Cisco 3600 series, and the Cisco 3700 series routers and integrated into Cisco IOS Release 12.2(8)T .
12.2(14)SX	Support for this command was implemented on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was integrated into Cisco IOS Release 12.2(17d)SXB.
12.2(18)SXE	This command was changed to support advanced QinQ translation on QinQ link bundles using GE-WAN interfaces on an OSM-2+4GE-WAN+ OSM on Cisco 7600 series routers.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.

Release	Modification
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.

Usage Guidelines

OSMs are not supported on Cisco 7600 series routers that are configured with a Supervisor Engine 32.

IP Address for the Physical Interface

You do not have to disable the IP address that is assigned to a physical interface that is part of a channel group, but Cisco highly recommends doing so.

Layer 2 and Layer 3 Port Channels

You can create both Layer 2 and Layer 3 port channels by entering the **interface port-channel** command or, when the channel-group gets its first physical interface assignment. The port channels are not created at run time, nor are they created dynamically.

You do not have to create a port-channel interface before assigning a physical interface to a channel group. A port-channel interface is automatically created when the channel group gets its first physical interface, if it is not already created.

Propagation of Configuration and Attribute Changes

Any configuration or attribute changes you make to the port-channel interface are propagated to all interfaces within the same channel group as the port channel. (for example, configuration changes are also propagated to the physical interfaces that are not part of the port-channel, but are part of the channel group.)

The on Keyword

When you use the **on**keyword, a usable EtherChannel exists only when a port group in on mode is connected to another port group in the on mode.

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

You do not have to create a port-channel interface before assigning a physical interface to a channel group. A port-channel interface is created automatically when the channel group gets its first physical interface, if it is not already created.

Cisco ASR 1000 Series Routers

The Cisco ASR 1000 series router has the following prerequisites and restriction:

- A port-channel must be created before member links are assigned to it.
- IP addresses must be disabled on member links before those links can be included in a port-channel.
- Fast Ethernet interfaces are not supported.

Cisco Catalyst Switches

The number of valid values for *number*depends on the software release. For software releases prior to Cisco IOS Release 12.1(3a)E3, valid values are from 1 to 256; for Cisco IOS Release 12.1(3a)E3, 12.1(3a)E4, and 12.1(4)E1, valid values are from 1 to 64. Cisco IOS Release 12.1 E and later releases support a maximum of 64 values ranging from 1 to 256.

The channel-group number is global and is shared between all the channeling protocols. If a specific channel number is used for the PAgP-enabled interfaces of a channel group, that same channel number cannot be used for configuring a channel that has LACP-enabled interfaces or vice versa.

Entering the **auto** or **desirable** keyword enables PAgP on the specified interface; the command will be rejected if it is issued on an LACP-enabled interface.

The **active** and **passive** keywords are valid on PAgP-disabled interfaces only.

You can change the mode for an interface only if it is the only interface that is designated to the specified channel group.

The **on** keyword forces the bundling of the interface on the channel without any negotiation.

You can manually configure a switch with PAgP on one side and LACP on the other side in the **on** mode.

With the **on** mode, a usable EtherChannel exists only when a port group in **on** mode is connected to another port group in **on** mode.

If you enter the **channel group** command on an interface that is added to a channel with a different protocol than the protocol you are entering, the command is rejected.

If the interface belongs to a channel, the **no** form of this command is rejected.

All ports in the same channel group must use the same protocol; you cannot run two protocols on one channel group.

PAgP and LACP are not compatible; both ends of a channel must use the same protocol.

You can change the protocol at any time, but this change causes all existing EtherChannels to reset to the default channel mode for the new protocol.

Configure all ports in an EtherChannel to operate at the same speed and duplex mode (full duplex only for LACP mode).

All ports in a channel must be on the same DFC-equipped module. You cannot configure any of the ports to be on other modules.

On systems that are configured with nonfabric-enabled modules and fabric-enabled modules, you can bundle ports across all modules, but those bundles cannot include a DFC-equipped module port.

You do not have to create a port-channel interface before assigning a physical interface to a channel group. A port-channel interface is created automatically when the channel group gets its first physical interface, if it is not already created.

You do not have to disable the IP address that is assigned to a physical interface that is part of a channel group, but it is highly recommended.

You can create both Layer 2 and Layer 3 port channels by entering the **interface port-channel** command or when the channel group gets its first physical interface assignment. The port channels are not created at runtime or dynamically.

Any configuration or attribute changes that you make to the port-channel interface are propagated to all interfaces within the same channel group as the port channel (for example, configuration changes are also propagated to the physical interfaces that are not part of the port channel but are part of the channel group).

When configuring Layer 2 EtherChannels, you cannot put Layer 2 LAN ports into manually created port-channel logical interfaces.

Only the **on** mode is supported when using this command with GE-WAN ports on the OSM-2+4GE-WAN+ OSM to create QinQ link bundles for advanced QinQ translation. Also, you cannot use the **channel-group** command on GE-WAN interfaces if MPLS is configured. You must remove all IP, MPLS, and other Layer 3 configuration commands before using the **channel-group** command with GE-WAN interfaces.

Note The GE-WAN interfaces on an OSM-2+4GE-WAN+ OSM behave slightly differently than other interfaces if you want to move the interface from one group to another. To move most other interfaces, you can enter the **channel-group** command again to delete the interface from the old group and move it to the new group. For GE-WAN ports, however, you must manually remove the interface from the group by entering the **no channel-group** command before assigning it to a new group.

Caution Do not enable Layer 3 addresses on the physical EtherChannel interfaces. Assigning bridge groups on the physical EtherChannel interfaces causes loops in your network.

For a complete list of guidelines, see the "Configuring EtherChannel" section of the *Cisco 7600 Series Router Cisco IOS Software Configuration Guide*.

Fast EtherChannel

Before you assign a Fast Ethernet interface to a Fast EtherChannel group, you must first create a port-channel interface. To create a port-channel interface, use the **interface port-channel** global configuration command.

If the Fast Ethernet interface has an IP address assigned, you must disable it before adding the Fast Ethernet interface to the Fast EtherChannel. To disable an existing IP address on the Fast Ethernet interface, use the **no ip address**command in interface configuration mode.

The Fast EtherChannel feature allows multiple Fast Ethernet point-to-point links to be bundled into one logical link to provide bidirectional bandwidth of up to 800 Mbps. Fast EtherChannel can be configured between Cisco 7500 series routers and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI) or between a Cisco 7500 series router or a Cisco 7000 series router with the RSP7000 and RSP700CI and a Cisco Catalyst 5000 switch.

A maximum of four Fast Ethernet interfaces can be added to a Fast EtherChannel group.

Caution The port-channel interface is the routed interface. Do not enable Layer 3 addresses on the physical Fast Ethernet interfaces. Do not assign bridge groups on the physical Fast Ethernet interfaces because it creates loops. Also, you must disable spanning tree.

To display information about the Fast EtherChannel, use the **show interfaces port-channel**EXEC command.

For more guidelines see the "Configuring EtherChannel" section of the *Cisco 7600 Series Router Cisco IOS Software Configuration Guide* and the "Configuring EtherChannel" section of the *Catalyst 6500 Series Switch Cisco IOS Software Configuration Guide*

Examples

This example shows how to add EtherChannel interface 1/0 to the EtherChannel group that is specified by port-channel 1:

```
Router(config-if)#
channel-group 1 mode on
Router(config-if)#
```

The following example shows how to add interface Fast Ethernet 1/0 to the Fast EtherChannel group specified by port-channel 1:

```
Router(config)#
interface port-channel 1
Router(config-if)#
```

```
exit
Router(config)#
interface fastethernet 1/0
Router(config-if)#
channel-group 1
```

Related Commands

Command	Description
interface	Creates a port-channel virtual interface and puts the CLI in interface configuration mode when the **port-channel** keyword is used.
ip address	Sets a primary or secondary IP address on an interface.
show etherchannel	Displays the EtherChannel information for a channel.
show interfaces port-channel	Displays traffic that is seen by a specific port channel.

clear counters

To clear the interface counters, use the **clearcounters** command in user EXEC or privileged EXEC mode.

clear counters commandclear counters [*interface-type interface-number*]

Cisco 7200 Series and 7500 Series with a Packet over SONET Interface Processor

clear counters [*interface-type*] *slot*/*port*

Cisco 7500 Series with Ports on VIP Cards

clear counters [*interface-type*] *slot*/*port-adapter*/*port*

Cisco 7600 Series

clear counters [*interface interface-number*| **null** *interface-number*| **port-channel** *number*| **vlan** *vlan-id*]

Syntax Description

interface-type	(Optional) Specifies the interface type; one of the keywords listed in Table 1 .
interface -number	(Optional) Specifies the interface number displayed with the **showinterfaces** command.
slot	Slot number. Refer to the appropriate hardware manual for slot and port information.
port	Port number. Refer to the appropriate hardware manual for slot and port information.
port-adapter	Port adapter number. Refer to the appropriate hardware manual for information about port adapter compatibility.
interface	(Optional) Interface type; possible valid values are **ethernet**, **fastethernetgigabitethernet**, and **tengigabitethernet**. See the “Usage Guidelines” section for additional valid values.
interface-number	(Optional) Module and port number; see the “Usage Guidelines” section for valid values.
null *interface-number*	(Optional) Specifies the null interface; the valid value is **0**.
port-channel *number*	(Optional) Specifies the channel interface; valid values are a maximum of 64 values ranging from 1 to 256.

vlan *vlan-id*	(Optional) Specifies the VLAN ID; valid values are from 1 to 4094.

Command Modes

User EXEC Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
11.2F	The **virtual-access** keyword was added.
11.3	The following keywords were added or modified: • **vg-anylan** keyword was added. • **posi** keyword was changed to **pos**.
12.2(15)T	The **ethernet** and **serial** keywords were removed because the LAN Extension feature is no longer available in Cisco IOS software.
12.2(17a)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

This command clears all the current interface counters from the interface unless the optional arguments *interface*-type and *interface*-numberare specified to clear only a specific interface type (serial, Ethernet, Token Ring, and so on). The table below lists the command keywords and their descriptions.

Note This command does not clear counters retrieved using Simple Network Management Protocol (SNMP), but only those seen with the **showinterface** command. However, variables seen with the **showinterface** command that could affect routing, such as load and reliability, or non-cumulative variables, such as input or output rates, are not cleared.

The *interface-number* argument designates the module and port number. Valid values for *interface-number* depend on the specified interface type and the chassis and module that are used. For example, if you specify a Gigabit Ethernet interface and have a 48-port 10/100BASE-T Ethernet module that is installed in a 13-slot chassis, valid values for the module number are from 1 to 13 and valid values for the port number are from 1 to 48.

Table 1: clear counters Interface Type Keywords

Keyword	Interface Type
async	Asynchronous interface
bri	ISDN BRI
dialer	Dialer interface
ethernet	Ethernet interface
fast-ethernet	Fast Ethernet interface
fddi	FDDI
hssi	High-Speed Serial Interface (HSSI)
line	Terminal line
loopback	Loopback interface
null	Null interface
port-channel	Port channel interface
pos	Packet OC-3 interface
serial	Synchronous serial interface
switch	Switch interface
tokenring	Token Ring interface
tunnel	Tunnel interface (IEEE 02.5)
vg-anylan	100VG-AnyLAN port adapter
virtual-access	Virtual-access interface (Refer to the *Cisco IOS Dial Technologies Command Reference* for details on virtual templates.)
virtual-template	Virtual-template interface (Refer to the *Cisco IOS Dial Technologies Command Reference* for details on virtual templates.)
virtual-tokenring	Virtual Token Ring interface

Examples

The following example shows how to clear all interface counters:

```
Router#
 clear counters
```

The following example shows how to clear the Packet OC-3 interface counters on a POSIP card in slot 1 on a Cisco 7500 series router:

```
Router#
 clear counters pos 1/0
```

The following example shows how to clear the interface counters on a Fast EtherChannel interface:

```
Router# clear counter port-channel 1
Clear "show interface" counters on all interfaces [confirm] Y
%CLEAR-5-COUNTERS: Clear counter on all interfaces by console 1
```

Related Commands

Command	Description
show interfaces	Displays the statistical information specific to a serial interface.
show interfaces port-channel	Displays the information about the Fast EtherChannel on Cisco 7500 series routers and Cisco 7000 series routers with the RSP7000 and RSP7000CI.
show queueing interface	Displays queuing information.

clear lacp counters

To clear the statistics for all interfaces belonging to a specific channel group, use the **clearlacpcounters** command in privileged EXEC mode.

clear lacp [*channel-group*] **counters**

Syntax Description

channel-group	(Optional) Channel group number; valid values are from 1 to 256.

Command Default

None

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

If you do not specify a *channel-group*, all channel groups are cleared.

If you enter this command for a channel group that contains members in PAgP mode, the command is ignored.

Examples

This example shows how to clear the statistics for a specific group:

```
Router# clear lacp 1 counters
Router#
```

Related Commands

Command	Description
show lacp	Displays LACP information.

clock rate through cut-through

cut-through

To configure the interfaces on the PA-12E/2FE port adapter to use cut-through switching technology between interfaces within the same bridge group, use the **cut-through**command in interface configuration mode. To return each interface to store-and-forward switching, use the **no**form of this command.

cut-through [**receive**| **transmit**]

no cut-through

Syntax Description

receive	(Optional) Selects cut-through switching technology on received data.
transmit	(Optional) Selects cut-through switching technology on transmitted data.

Command Default

Store-and-forward switching technology (that is, no cut-through)

Command Modes

Interface configuration

Command History

Release	Modification
11.2P	This command was introduced.'
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Cut-through mode allows switched packets to be transmitted after 64 bytes are received. The transmission of the packets can start before the end of the packet arrives. This reduces the time spent in the switch, but allows packets to be transmitted with bad cyclical redundancy checks (CRCs), because the transmission is initiated before the CRC is received or checked. Store-and-forward mode waits for the entire packet to be received before that packet is forwarded, but will check the CRC before starting transmission.

The PA-12E/2FE port adapter offloads Layer 2 switching from the host CPU by using store-and-forward or cut-through switching technology between interfaces within the same VLAN on the PA-12E/2FE port adapter. The PA-12E/2FE port adapter supports up to four VLANs (bridge groups).

Examples

The following example configures interface 3/0 for cut-through switching:

```
Router(config)#
 interface fastethernet 3/0
Router(config-if)#
 bridge-group 10
Router(config-if)#
 cut-through
Router(config-if)#
 no shutdown
Router(config-if)# exit
```

D through E

define interface-range

To create an interface-range macro, use the **define interface-range** command in global configuration mode. To remove an interface-range macro, use the **no** form of this command.

define interface-range *macro-name interface-range*

Syntax Description

macro-name	Name of the interface-range macro.
interface-range	Type of interface range. • For a list of valid values, see the "Usage Guidelines" section.

Command Default

Interface-range macro is not configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(14)SX	This command was introduced.
12.2(17d)SXB	This command was integrated into Cisco IOS XE Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

- The **define interface-range** command applies a particular configuration on multiple interfaces and creates multiple logical, and sub interfaces.
- An interface range macro name can comprise up to 32 characters.
- An interface range for a macro can accept a maximum of five ranges. However, the subinterface range for a macro accepts only one range.
- An interface range cannot span slots.
- Use the *interface-type slot/first-interface last-interface* format to enter the interface range.
- Valid values for the *interface-type* argument are as follows:
  - **atm** —Supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2
  - **ethernet**

- **fastethernet**
- **ge-wan** —Supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2
- **gigabitethernet**
- **loopback**
- **port-channel** *interface-number* —Valid values are from 1 to 256
- **pos** —Supported on Cisco 7600 series routers that are configured with a Supervisor Engine 2
- **tengigabitethernet**
- **tunnel**
- **vlan** *vlan-id* —Valid values are from 1 to 4094

Examples

The following example shows how to create a multiple-interface macro:

```
Device(config)# define interface-range macro1 ethernet 1/2 - 5, fastethernet 5/5 - 10
```

The following example shows how to create multiple loopback interfaces:

```
Device(config)# define interface-range loopback1-10
```

Related Commands

Command	Description
interface range	Executes a command on multiple ports at the same time.

duplex

To configure duplex operation on an interface, use the**duplex** command in interface configuration mode. To return to the default value, use the **no** form of this command.

duplex {**full**| **half**| **auto**}

no duplex

Syntax Description

full	Specifies full-duplex operation.
half	Specifies half-duplex operation.
auto	Enables autonegotiation. The interface automatically operates at half or full-duplex depending on environmental factors, such as the type of media and the transmission speeds for the peer routers, hubs, and switches used in the network configuration.

Command Default

Half-duplex mode

For the 4-Port 10/100 Fast Ethernet Shared Port Adapter (SPA) and the 2-Port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 router, the default is **auto**.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
11.2(10)P	This command was introduced.
12.2S	This command was integrated into Cisco IOS Release 12.2S.
12.2(14)SX	This command was modified. Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	This command was modified. Support for this command on the Supervisor Engine 2 was extended to Cisco IOS Release 12.2 SXB.
12.2(20)S2	This command was implemented on the 4-Port 10/100 Fast Ethernet SPA and the 2-Port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 router.

Usage Guidelines

General Usage Guidelines

To use the autonegotiation capability (that is, automatically detect speed and duplex modes) you must set both the **speed** command and the **duplex** command to auto.

Duplex Options and Interfaces

The table below lists the supported command options by an interface.

Table 2: Supported Duplex Command Options

Interface Type	Supported Syntax	Default Setting	Usage Guidelines
10/100-Mbps module	**duplex** [**half** | **full**]	See the "Usage Guidelines" section.	Run the **no duplex auto** command to set the speed to **auto**. If the speed is set to **10** or **100**, and you do not configure the duplex setting, the duplex is set to **half.**
100-Mbps fiber modules	**duplex** [**half** | **full**]	**half**	
Gigabit Ethernet interfaces	**duplex full**	**full**	
10-Mbps ports	**duplex** [**half** | **full**]	**half**	

If the transmission speed on a 16-port RJ-45 Gigabit Ethernet port is set to 1000, the duplex mode is set to full. If the transmission speed is changed to 10 or 100, the duplex mode stays at half-duplex. You must configure the correct duplex mode when the transmission speed is changed to 10 or 100 from 1000.

Gigabit Ethernet is full-duplex only. You cannot change the duplex mode on Gigabit Ethernet ports or on a 10/100/1000-Mbps port that is configured for Gigabit Ethernet.

When manually configuring the interface speed to either 10 or 100-Mbps, you should also configure the duplex mode on the interface.

Caution Changing the interface speed and duplex mode configuration might shut down and reenable the interface during reconfiguration.

Usage Guidelines for the 4-Port 10/100 Fast Ethernet SPA and the 2-Port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 router

The **duplex** command is applied to the SPA interfaces that are using the RJ-45 media. Gigabit Ethernet interfaces using fiber media support full-duplex mode only, and use the **negotiation** command to enable and disable autonegotiation.

To enable the autonegotiation capability on an RJ-45 interface, you must set either the **speed** command or the **duplex** command to **auto**. The default configuration is that both commands are set to **auto**.

Note For the Cisco AS5300, the **duplexfullhalfauto**} command syntax replaces the duplex commands: **half-duplex**and **full-duplex.**Cisco 7600 series routers cannot automatically negotiate the interface speed and duplex mode if either of the connecting interfaces is configured to a value other than **auto**.

The table below describes the interface behavior for different combinations of the **duplex** and **speed** command settings. The specified **duplex** command configured with the specified **speed** command produces the resulting system action.

If you specify both **duplex** and **speed** settings other than **auto**on an RJ-45 interface, then autonegotiation is disabled for the interface.

Note If you need to force an interface port to operate with certain settings and therefore need to disable autonegotiation, you must be sure that the remote link is configured with compatible link settings for proper transmission. This includes the support of flow control on the link.

Note Every interface on a 4-Port 10/100 Fast Ethernet SPA supports transmission of pause frames to stop packet flow when the Modular Services Card (MSC) is full. You cannot disable flow control for an interface on the 4-Port 10/100 Fast Ethernet SPA. Hence the flow control support is not configurable, but it is advertised during autonegotiation. If you disable autonegotiation, then you must be sure that the remote device is configured to support flow control because flow control is automatically enabled for all interfaces on the 4-Port 10/100 Fast Ethernet SPA.

Table 3: Relationship Between duplex and speed Commands

duplex Command	speed Command	Resulting System Action
duplex auto	**speed auto**	Autonegotiates both speed and duplex mode s. The interface advertises capability for the following link settings: • 10-Mbps and half-duplex • 10-Mbps and full-duplex • 100-Mbps and half-duplex • 100-Mbps and full-duplex • 1000-Mbps and half-duplex • 1000-Mbps and full-duplex

duplex Command	speed Command	Resulting System Action
duplex auto	**speed 10** or**speed100**or**speed1000**	Autonegotiates the duplex mode. The interface advertises the capability for the configured speed with capability for both half-duplex or full-duplex mode. For example, if the **speed100**command is configured with **duplexauto**, then the interface advertises the following capability: • 100-Mbps and half-duplex • 100-Mbps and full-duplex
duplex half or**duplexfull**	**speed auto**	Autonegotiates the speed. The interface advertises the capability for the configured duplex mode with capability for both 10-Mbps and 100-Mbps operation for Fast Ethernet interfaces, and 10-Mbps, 100-Mbps, and 1000-Mbps for Gigabit Ethernet interfaces. For example, if the **duplexfull**command is configured with the **speedauto** command, then the interface advertises the following capability: • 10-Mbps and full-duplex • 100-Mbps and full-duplex • 1000-Mbps and full-duplex (Gigabit Ethernet interfaces only)
duplex half	**speed 10**	Forces 10-Mbps and half-duplex operation, and disables autonegotiation on the interface.
duplex full	**speed 10**	Forces 10-Mbps and full-duplex operation, and disables autonegotiation on the interface.
duplex half	**speed 100**	Forces 100-Mbps and half-duplex operation, and disables autonegotiation on the interface.

duplex Command	speed Command	Resulting System Action
duplex full	**speed 100**	Forces 100-Mbps and full-duplex operation, and disables autonegotiation on the interface.
duplex half	**speed 1000**	Forces 1000-Mbps and half-duplex operation, and disables autonegotiation on the interface (Gigabit Ethernet only).
duplex full	**speed 1000**	Forces 1000-Mbps and full-duplex operation, and disables autonegotiation on the interface (Gigabit Ethernet only).

Examples

The following example shows how to configure a full-duplex operation on a Cisco AS5300:

```
Router(config)# interface fastethernet 0
Router(config-if)# duplex full
```

The following example shows how to specify the advertisement of half-duplex support only, and either 10-Mbps or 100-Mbps capability during autonegotiation for the second interface (port 1) on the SPA located in the bottom subslot (1) of the MSC that is installed in slot 2 of the Cisco 7304 router:

```
Router# configure terminal
Router(config)# interface fastethernet 2/1/1
Router(config-if)# duplex half
Router(config-if)# speed auto
```

With this configuration, the interface advertises the following capabilities during autonegotiation:

- 10-Mbps and half-duplex
- 100-Mbps and half-duplex

Note Flow control support is always advertised when autonegotiation is enabled.

Related Commands

Command	Description
interface	Configures an interface and enters interface configuration mode.
interface fastethernet	Selects a particular Fast Ethernet interface for configuration.
interface gigabitethernet	Selects a particular Gigabit Ethernet interface for configuration.

Command	Description
show controllers	Displays information that is specific to the hardware on a module.
show controllers fastethernet	Displays Fast Ethernet interface information, transmission statistics, and errors, and the applicable MAC destination address and VLAN filtering tables.
show controllers gigabitethernet	Displays Gigabit Ethernet interface information, transmission statistics, and errors, and applicable MAC destination address and VLAN filtering tables.
show interfaces	Displays traffic that is seen by a specific interface.
show interfaces fastethernet	Displays information about Fast Ethernet interfaces.
show interfaces gigabitethernet	Displays information about Gigabit Ethernet interfaces.
speed	Sets the port speed for a Fast Ethernet interface.

errdisable recovery

To configure recovery mechanism variables, use the **errdisable recovery** command in global configuration mode. To return to the default state, use the **no** form of this command.

errdisable recovery {**cause** {**all**| **arp-inspection**| **bpduguard**| **channel-misconfig**| **dhcp-rate-limit**| **dtp-flap**| **gbic-invalid**| **l2ptguard**| **link-flap**| **pagp-flap**| **psecure-violation**| **security-violation**| **rootguard**| **udld**| **unicast-flood**}| **interval** *seconds*}

no errdisable recovery {**cause** {**all**| **arp-inspection**| **bpduguard**| **channel-misconfig**| **dhcp-rate-limit**| **dtp-flap**| **gbic-invalid**| **l2ptguard**| **link-flap**| **pagp-flap**| **psecure-violation**| **security-violation**| **rootguard**| **udld**| **unicast-flood**}| **interval** *seconds*}

Syntax Description

cause	Enables error-disable recovery from a specific cause.
all	Enables the recovery timers for all error-disable causes.
arp-inspection	Enables error-disable recovery from an Address Resolution Protocol (ARP) inspection cause.
bpduguard	Enables the recovery timer for the Bridge Protocol Data Unit (BPDU)-guard error-disable cause.
channel-misconfig	Enables the recovery timer for the channel-misconfig error-disable cause.
dhcp-rate-limit	Enables the recovery timer for the Dynamic Host Configuration Protocol (DHCP)-rate-limit error-disable cause.
dtp-flap	Enables the recovery timer for the Dynamic Trunking Protocol (DTP)-flap error-disable cause.
gbic-invalid	Enables the recovery timer for the Gigabit Interface Converter (GBIC)-invalid error-disable cause.
l2ptguard	Enables the recovery timer for the Layer 2 Protocol Tunneling (L2PT) error-disable cause.
link-flap	Enables the recovery timer for the link-flap error-disable cause.
pagp-flap	Enables the recovery timer for the Port Aggregation Protocol (PAgP)-flap error-disable cause.
psecure-violation	Enables the recovery timer for the psecure-violation error-disable cause.

security-violation	Enables the automatic recovery of ports that were disabled because of 802.1X security violations.
rootguard	Enables the recovery timer for the root-guard error-disable cause.
udld	Enables the recovery timer for the Unidirectional Link Detection (UDLD) error-disable cause.
unicast-flood	Enables the recovery timer for the unicast-flood error-disable cause.
interval *seconds*	Specifies the time, in seconds, to recover from a specified error-disable cause. The range is from 30 to 86400. The default interval is 300.

Command Default

The recovery mechanisms are disabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
15.0(1)M	This command was introduced in a release earlier than Cisco IOS Release 15.0(1)M.
12.2(14)SX	This command was modified. This command was implemented on the Supervisor Engine 720.
12.2(17d)SXB	This command was modified. This command was implemented on the Supervisor Engine 2.
12.2(18)SXD	This command was modified. The **arp-inspection** keyword was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

A cause (bpduguard, channel-misconfig, dhcp-rate-limit, dtp-flap, l2ptguard, link-flap, pagp-flap, psecure-violation, security-violation, rootguard, udld, or unicast-flood) is defined as the reason why the error-disable state occurred. When a cause is detected on an interface, the interface is placed in an error-disable state (an operational state that is similar to the link-down state). If you do not enable error-disable recovery for the cause, the interface stays in the error-disable state until a shutdown and no shutdown occur. If you enable recovery for a cause, the interface is brought out of the error-disable state and allowed to retry operation once all the causes have timed out.

You must enter the **shutdown** command and then the **no shutdown** command to manually recover an interface from the error-disable state.

Note A separate line is required each time you want to enter the **errdisable recovery cause** command to add a new reason for recovery; each new reason does not get appended to the original single line. This means you must enter each new reason separately.

Examples

This example shows how to enable the recovery timer for the BPDU-guard error-disable cause:

```
Router(config)#
 errdisable recovery cause bpduguard
```

This example shows how to set the recovery timer to 300 seconds:

```
Router(config)#
 errdisable recovery interval 300
```

Related Commands

Command	Description
show errdisable recovery	Displays the information about the error-disable recovery timer.
show interfaces status	Displays the interface status or a list of interfaces in an error-disabled state on LAN ports only.
shutdown	Disables an interface.

F through H

fddi frames-per-token

To specify the maximum number of frames that the FDDI interface transmits per token capture, use the **fddiframes-per-token** command in interface configuration mode. To revert to the default value, use the **no** form of this command.

fddi frames-per-token *number*

no fddi frames-per-token

Syntax Description

number	Maximum number of frames to transmit per token capture. Valid values are from 1 to 10. The default is 3.

Command Default

3 frames

Command Modes

Interface configuration

Command History

Release	Modification
11.2 P	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Changing the value will increase or decrease the maximum number of frames that the FDDI interface can transmit when it receives a token. Increasing the value does not necessarily mean more frames will be transmitted on each token capture. This is heavily dependent on the traffic load of the specific interface.

When the interface captures a token, it transmits all of the frames that are queued in the interface's transmit ring, up to a maximum value specified by the**fddiframes-per-token** command.

If there are no frames ready for transmission, the token is passed on, and no frames are transmitted. If there are less than the **fddiframes-per-token**valuein the transmit ring, all frames in the transmit ring are transmitted before the token is passed on. If there are more than the **fddiframes-per-token**value in the transmit ring, the specified value is transmitted before the token is passed on. The remaining frames in the transmit ring remain queued until the token is captured again.

Examples

The following example shows how to configure the FDDI interface to transmit four frames per token capture:

```
Router(config-if)# fddi frames-per-token 4
```

flowcontrol

To configure a port to send or receive pause frames, use the **flowcontrol** command in interface configuration mode. To return to the default settings, use the **no** form of this command.

flowcontrol {**send**| **receive**} {**desired**| **off**| **on**}

no flowcontrol {**send**| **receive**} {**desired**| **off**| **on**}

Syntax Description

send	Specifies that a port sends pause frames.
receive	Specifies that a port processes pause frames.
desired	Obtains predictable results regardless of whether a remote port is set to **on**, **off**, or **desired**.
off	Prevents a local port from receiving and processing pause frames from remote ports or from sending pause frames to remote ports.
on	Enables a local port to receive and process pause frames from remote ports or send pause frames to remote ports.

Command Default

Flow control is disabled.

Flow-control defaults depend upon port speed. The defaults are as follows:

- Gigabit Ethernet ports default to **off** for receive and **desired** for send.
- Fast Ethernet ports default to **off** for receive and **on** for send.
- On the 24-port 100BASE-FX and 48-port 10/100 BASE-TX RJ-45 modules, the default is **off** for receive and **off** for send.
- You cannot configure how WS-X6502-10GE 10-Gigabit Ethernet ports respond to pause frames. WS-X6502-10GE 10-Gigabit Ethernet ports are permanently configured to respond to pause frames.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(14)SX	This command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	This command was implemented on the Supervisor Engine 2.

Release	Modification
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SCB	This command was integrated into Cisco IOS Release 12.2(33)SCB.

Usage Guidelines

The **send** and **desired** keywords are supported on Gigabit Ethernet ports only.

Pause frames are special packets that signal a source to stop sending frames for a specific period of time because the buffers are full.

Gigabit Ethernet ports on the Catalyst 6500 series switches and on the Cisco 7600 series routers use flow control to inhibit the transmission of packets to the port for a period of time; other Ethernet ports use flow control to respond to flow-control requests.

If a Gigabit Ethernet port receive buffer becomes full, the port transmits a “pause” packet that tells remote ports to delay sending more packets for a specified period of time. All Ethernet ports (1000 Mbps, 100 Mbps, and 10 Mbps) can receive and act upon “pause” packets from other devices.

You can configure non-Gigabit Ethernet ports to ignore received pause frames (disable) or to react to them (enable).

When used with the **receive**keyword, the **on** and **desired** keywords have the same result.

All the Gigabit Ethernet ports on the Catalyst 6500 series switches and the Cisco 7600 series routers can receive and process pause frames from remote devices.

To obtain predictable results, follow these guidelines:

- Use **sendon** only when remote ports are set to **receiveon** or **receivedesired**.
- Use **sendoff** only when remote ports are set to **receiveoff** or **receivedesired**.
- Use **receiveon** only when remote ports are set to **sendon** or **senddesired**.
- Use **sendoff** only when remote ports are set to **receiveoff** or **receivedesired**.

Examples

These examples show how to configure the local port to not support any level of flow control by the remote port:

```
Router# configure terminal

Router(config)# interface GigabitEthernet1/9 10.4.9.157 255.255.255.0

Router(config-if)# flowcontrol receive off
Router(config-if)# flowcontrol send off
```

Related Commands

Command	Description
show interfaces flowcontrol	Displays flow-control information.

full-duplex

To specify full-duplex mode on full-duplex single-mode and multimode port adapters, use the **full-duplex**command in interface configuration mode. To restore the default half-duplex mode, use the **no** form of this command.

full-duplex

no full-duplex

Syntax Description

This command has no arguments or keywords.

Command Default

Half-duplex; a Fast Ethernet Interface Processor (FEIP), and serial interfaces that are configured for bisynchronous tunneling

Command Default

Autonegotiation

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.
11.3	This command was modified to include information on FDDI full-duplex, single-mode, and multimode port adapters.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use this command if the equipment on the other end is capable of full-duplex mode.

This command specifies full-duplex mode on full-duplex single-mode and multimode port adapters available on the following networking devices:

- Cisco 7200 series routers
- Second-generation Versatile Interface Processors (VIP2s) in Cisco 7500 series routers
- FEIP ports

- Serial interface ports that uses bisynchronous tunneling

Refer to the *CiscoProductCatalog* for hardware compatibility information and for specific model numbers of port adapters.

To enable half-duplex mode, use the **nofull-duplex** or **half-duplex** command.

Note For the Cisco AS5300, the **duplexfull**| **halfauto**} command replaces the **full-duplex** and **half-duplex** commands. You will get the following error messages if you try to use the **full-duplex** and **half-duplex** commands on a Cisco AS5300: Router(config)# **interfacefastethernet0** Router(config-if)# **full-duplex** Please use duplex command to configure duplex mode Router(config-if)# Router(config-if)# **half-duplex** Please use duplex command to configure duplex mode

Support for This Command

Use the question mark (?) command to find out which port adapters support this command. If the interface does not support full-duplex, an informational message displayed, and no changes are made to the interface. To determine if the interface supports full-duplex, use the **showinterfaces**command. For example, the following message is displayed if the interface does not support full-duplex:

```
% interface does not support full-duplex.
```

Use on FDDI

Full-duplex on the FDDI full-duplex port adapters allows an FDDI ring with exactly two stations to transform the ring into a full-duplex, point-to-point topology. For the interface to operate in full-duplex mode, there must be only two stations on the ring, the two stations must be capable of operating in full-duplex mode, and both stations must complete a full-duplex autoconfiguration protocol. There is no FDDI token in full-duplex mode. Refer to the *CiscoProductCatalog* for specific model numbers of port adapters.

Full-duplex autoconfiguration protocol allows an FDDI station to dynamically and automatically operate in either half-duplex (or ring) or full-duplex mode, and ensures that the stations fall back to ring mode when a configuration change occurs, such as a third station joining the ring.

After booting the router, the FDDI stations begin operation in half-duplex mode. While the station performs the full-duplex autoconfiguration protocol, the station continues to provide data-link services to its users. Under normal conditions, the transition between half-duplex mode and full-duplex mode is transparent to the data-link users. The data-link services provided by full-duplex mode are functionally the same as the services provided by half-duplex mode.

If you change the full-duplex configuration (for example, from disabled to enabled) on supported interfaces, the interface resets.

Cisco 10000 Series Router

The Fast Ethernet line card responds only to 802.3x pause frames from another device when it autonegotiates the duplex mode (the default). The line card does not support 802.3x flow control when you manually set half-duplex or full-duplex mode.

Examples

Examples

The following example configures full-duplex mode on the Cisco 7200 series routers:

```
Router(config)# interface fastethernet 0/1
Router(config-if)# full-duplex
```

Examples

The following example specifies full-duplex binary synchronous communications (Bisync) mode:

```
Router(config)# interface serial 0
Router(config-if)# encapsulation bstun
Router(config-if)# full-duplex
```

Examples

The following example enables full-duplex mode on FDDI interface 0:

```
Router(config)# interface fddi 0/1/0
Router(config-if)# full-duplex
```

Related Commands

Command	Description
half-duplex	Specifies half-duplex mode on an SDLC interface or on the FDDI full-duplex, single-mode port adapter and FDDI full-duplex, multimode port adapter on the Cisco 7200 series and Cisco 7500 series routers.
interface	Configures an interface type and enters interface configuration mode.
interface fastethernet	Selects a particular Fast Ethernet interface for configuration.
interface serial	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed-bit signaling).
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show interfaces fddi	Displays information about the FDDI interface.

hub

To enable and configure a port on an Ethernet hub of a Cisco 2505 or Cisco 2507 router, use the **hub** command in global configuration mode.

hub ethernet *number port* [*end-port*]

Syntax Description

ethernet	Indicates that the hub is in front of an Ethernet interface.
number	Hub number, starting with 0. Because there is only one hub, this number is 0.
port	Port number on the hub. On the Cisco 2505 router, port numbers range from 1 to 8. On the Cisco 2507 router, port numbers range from 1 to 16. If a second port number follows, then this port number indicates the beginning of a port range.
end-port	(Optional) Last port number of a range.

Command Default

No hub ports are configured.

Command Modes

Global configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command does not have a **no** form.

Examples

The following example enables port 1 on hub 0:

```
Router# hub ethernet 0 1
Router(config-hub)# no shutdown
```

The following example enables ports 1 through 8 on hub 0:

```
Router# hub ethernet 0 1 8
Router(config-hub)# no shutdown
```

Related Commands

Command	Description
shutdown (hub)	Shuts down a port on an Ethernet hub of a Cisco 2505 or Cisco 2507 router.

I through K

interface

To configure an interface type and to enter interface configuration mode, use the **interface** command in the appropriate configuration mode.

Standard Syntax

interface *type number* [*name-tag*]

Module-Specific and Platform-Specific Syntax

Analysis Module Network Module

interface analysis-module *slot*/*unit*

Content Engine Network Module

interface content-engine *slot*/*unit*

Cisco 830 Series

interface *type* [*number*]

Cisco 2600 Series

interface *type slot*/{*port-adapter*| *port* . *subinterface-number*}

Cisco 2600 Series on Voice Interfaces

interface *type slot*/*voice-module-slot*/*voice-interface-slot*

Cisco 3600 Series

interface *type slot*/{*port*| *port* . *subinterface-number*}

Cisco 3600 Series on Voice Interfaces

interface *type slot*/*voice-module-slot*/*voice-interface-slot*

Cisco 7100 Series

interface *type slot*/{*port-adapter*| *port* . *subinterface-number*}

Cisco 7200 Series and Cisco 7500 Series with a Packet over SONET Interface Processor

interface *type slot*/*port*

Cisco 7200 VXR Router Used as a Router Shelf in a Cisco AS5800 Universal Access Server

interface *type router-shelf*/*slot*/*port*

Cisco 7500 Series with Channelized T1 or E1

interface serial *slot*/*port* : *channel-group*

Cisco 7500 Series with Ports on VIP Cards

interface *type slot*/*port-adapter*/*port*

Cisco 7600 Series

interface *type number*

Note: The number format varies depending on the network module or line card type and the router's chassis slot it is installed in. Refer to the appropriate hardware manual for numbering information

Cisco 7600 Series with Ports on Ethernet Service Cards

interface type *slot*/*bay*/*port* **access**

Note: The syntax may vary depending on the Ethernet service line card type. Refer to the appropriate hardware manual for numbering information. For example, for the ES20 line card the syntax takes the following format:

Subinterface Syntax Forms in Global Configuration Mode

Cisco 7200 Series

interface *type slot*/*port . subinterface-number* [**multipoint**| **point-to-point**]

Cisco 7500 Series

interface *type slot*/*port-adapter . subinterface-number* [**multipoint**| **point-to-point**]

Cisco 7500 Series with Ports on VIP Cards

interface *type slot*/*port-adapter*/*port . subinterface-number* [**multipoint**| **point-to-point**]

Cisco ASR 901 Series Aggregation Services Routers

no interface *type number*

no interface *type number*

Shared Port Adapters

interface *type slot*/*subslot*/*port* [*. subinterface-number*]

Cisco ASR 901 Series Aggregation Services Routers

no interface *type number*

no interface *type number*

Syntax Description

type	Type of interface to be configured. See the table below.

number	Port, connector, or interface card number. On Cisco 830 series routers, the *number*argumentspecifies the ethernet interface number. On Cisco 4700 series routers, the number argument specifies the network interface module (NIM) or network processor module (NPM) number. The numbers are assigned at the factory at the time of installation or when added to a system; they can be displayed with the **showinterfaces** command. For Cisco ASR 901 Series Aggregation Services Routers, the range is from 1 to 8.
name-tag	(Optional) Specifies the logic name to identify the server configuration so that multiple server configurations can be entered. This optional argument is for use with the Redundant Link Manager (RLM) feature.
slot	Chassis slot number. Refer to the appropriate hardware manual for slot information. For SIPs, refer to the platform-specific SPA hardware installation guide or the corresponding "Identifying Slots and Subslots for SIPs and SPAs" topic in the platform-specific SPA software configuration guide.
/ *voice-module-slot*	Voice module slot number. The slash(/)is required. Refer to the “Cisco 3700 Series Routers Voice Interface Numbering” section of the “Understanding Interface Numbering and Cisco IOS Basics” chapter in the platform-specific SPA software configuration guide.
/ *voice-interface-slot*	Voice interface slot number. The slash(/)is required. Refer to the “Cisco 3700 Series Routers Voice Interface Numbering” section of the “Understanding Interface Numbering and Cisco IOS Basics” chapter in the platform-specific SPA software configuration guide.
/ *subslot*	Secondary slot number on a SIP where a SPA is installed. The slash (/) is required. Refer to the platform-specific SPA hardware installation guide and the corresponding "Specifying the Interface Address on a SPA" topic in the platform-specific SPA software configuration guide for subslot information.

/ *unit*	Number of the daughter card on the network module. For analysis module and content engine (CE) network modules, always use 0. Theslash(/)is required.
/bay	Card interface bay number in a slot. Theslash(/)is required. Refer to the appropriate hardware manual for bay information.
/ *port*	Port or interface number. Theslash(/)is required. Refer to the appropriate hardware manual for port information. For SPAs, refer to the corresponding "Specifying the Interface Address on a SPA" topics in the platform-specific SPA software configuration guide.
router-shelf	Router shelf number in a Cisco AS5800 universal access server. Refer to the appropriate hardware manual for router shelf information.
: *channel-group*	Channel group number. Cisco 7500 series routers specify the channel group number in the range of 0 to 4 defined with the **channel-group** controller configuration command.
/ *port-adapter*	Port adapter number. Refer to the appropriate hardware manual for information about port adapter compatibility. Theslash(/) is required.
. *subinterface-number*	Subinterface number in the range 1 to 4294967293. The number that precedes the period (.) must match the number to which this subinterface belongs.
access	Creates an access interface for an IP subscriber. The access interface is configured as a subinterface of the physical interface that the IP subscriber is connected to.
multipoint | **point-to-point**	(Optional) Specifies a multipoint or point-to-point subinterface. There is no default .

Command Default No interface types are configured.

Command Modes

- RITE configuration (config-rite)
- RITE configuration (config-rite)

Note To use this command with the RLM feature, the networking device must be in interface configuration mode.

Command History

Release	Modification
10.0	This command was introduced for the Cisco 7000 series routers.
11.0	This command was implemented on the Cisco 4000 series routers.
12.0(3)T	The optional *name-tag*argument was added for the RLM feature.
12.2(13)T	The **content-engine** keyword was added.
12.2(15)T	The **lex** keyword was removed because the LAN Extension feature is no longer available in Cisco IOS software.
12.2(20)S2	This command was implemented for SPAs on the Cisco 7304 router.
12.3(4)T	The **serviceengine** keyword was added. Support was added for the **interface** command to be used in RITE configuration mode to support IP trfaffic export profiles.
12.3(7)T	The **analysis-module** keyword was added.
12.2(22)S	Support for RITE configuration mode and IP traffic export profiles was added.
12.3(14)T	The **satellite** keyword was added to support satellite interface configuration on network modules.
12.2(18)SXE	This command was implemented for SPAs on the Cisco 7600 series routers and Catalyst 6500 series switches.
12.0(31)S	This command was implemented for SPAs on the Cisco 12000 series routers.
12.2(18)SXF	The **tengigabitethernet** keyword was added for support of the10 Gigabit Ethernet interface type.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
Cisco IOS XE 2.1	This command was implemented on Cisco ASR 1000 series routers.
15.1(2)SNG	This command was implemented on Cisco ASR 901 Series Aggregation Services Routers.
15.1(2)SNG	This command was implemented on Cisco ASR 901 Series Aggregation Services Routers.

Usage Guidelines

This command does not have a **no** form except for Cisco ASR 901 Series Aggregation Services Routers.

The table below displays the keywords that represent the types of interfaces that can be configured with the **interface** command. Replace the *type* argument with the appropriate keyword from the table.

Table 4: Interface Type Keywords

Keyword	Interface Type
analysis-module	Analysis module interface. The analysis module interface is a Fast Ethernet interface on the router that connects to the internal interface on the Network Analysis Module (NAM). This interface cannot be configured for subinterfaces or for speed, duplex mode, and similar parameters. See the command-line interface (CLI) help for a list of valid parameters.
async	Port line used as an asynchronous interface.
atm	ATM interface.
bri	ISDN BRI. This interface configuration is propagated to each of the B channels. B channels cannot be individually configured. The interface must be configured with dial-on-demand commands in order for calls to be placed on that interface.
content-engine	Content engine (CE) network module interface. The CE network module interface cannot be configured for subinterfaces or for speed, duplex mode, and similar parameters. See the command-line interface (CLI) help for a list of valid parameters. **Note** The **content-engine** keyword was formerly documented as the **interfacecontent-engine** command.
dialer	Dialer interface.
ethernet	Ethernet IEEE 802.3 interface.
fastethernet	100-Mbps Ethernet interface. In RITE configuration mode, specifies the outgoing (monitored) interface for exported IP traffic. **Note** The **fastethernet** keyword was formerly documented as the **interfacefastethernet** command.
fddi	FDDI interface.

Keyword	Interface Type
gigabitethernet	1000-Mbps Ethernet interface. **Note** The **gigabitethernet** keyword was formerly documented as the **interfacegigabitethernet** command.
group-async	Master asynchronous interface. **Note** The **group-async** keyword was formerly documented as the **interfacegroup-async** command.
hssi	High-Speed Serial Interface (HSSI).
loopback	Software-only loopback interface that emulates an interface that is always up. It is a virtual interface supported on all platforms. The *number* argument is the number of the loopback interface that you want to create or configure. There is no limit on the number of loopback interfaces that you can create.
null	Null interface.
port-channel	Port channel interface. **Note** The **port-channel** keyword was formerly documented as the **interfaceport-channel** command.
pos	Packet OC-3 interface on the Packet-over-SONET (POS) interface processor. **Note** The **pos** keyword was formerly documented as the **interfacepos** command.
Satellite	Satellite network module. Enters satellite configuration mode.
sdcc	Section data communications channel interface.
serial	Serial interface.
service-engine	Network module (NM) or an Advanced Integration Module (AIM), this command may be used for NMs and AIMs only. If your system does not have this hardware, you will be unable to enter this command. The no form of this command (no interface service-engine) is not available. The exit command can be used to exit interface configuration mode.
switch	Switch interface.
tengigabitethernet	10-Gigabit Ethernet interface.

Keyword	Interface Type
tokenring	Token Ring interface.
tunnel	Tunnel interface; a virtual interface. The *number* argument is the number of the tunnel interface that you want to create or configure. There is no limit on the number of tunnel interfaces that you can create.
vg-anylan	100VG-AnyLAN port adapter. **Note** The **vg-anylan** keyword was formerly documented as the **interfacevg-anylan** command.

Creating an IP Traffic Export Profile

Ip traffic export is intended only for software switching platforms; distributed architectures are not supported.

After you configure an IP traffic export profile using the **iptraffic-exportprofile**global configuration command, you must also include the **interface**command after the **iptraffic-exportprofile**command; otherwise, the profile will be unable to export the captured IP packets. If you do not use the **interface** command, you will receive a warning that indicates that the profile is incomplete.

Subinterfaces

Subinterfaces can be configured to support partially meshed Frame Relay networks. Refer to the "Configuring Serial Interfaces" chapter in the *CiscoIOSInterfaceandHardwareComponentConfigurationGuide*.

Using the analysis-module Keyword

The analysis module interface is used to access the NAM console for the initial configuration. After the NAM IP parameters are configured, the analysis module interface is typically used only during NAM software upgrades and while troubleshooting if the NAM Traffic Analyzer is inaccessible.

Visible only to the Cisco IOS software on the router, the analysis module interface is an internal Fast Ethernet interface on the router that connects to the internal NAM interface. The analysis module interface is connected to the router's Peripheral Component Interconnect (PCI) backplane, and all configuration and management of the analysis module interface must be performed from the Cisco IOS CLI.

Using the group-async Keyword

Using the **group-async** keyword, you create a single asynchronous interface with which other interfaces are associated as members using the **group-range**command. This one-to-many configuration allows you to configure all associated member interfaces by entering one command on the group master interface, rather than entering this command on each individual interface. You can create multiple group masters on a device; however, each member interface can be associated only with one group.

Using the port-channel Keyword

The Fast EtherChannel feature allows multiple Fast Ethernet point-to-point links to be bundled into one logical link to provide bidirectional bandwidth of up to 800 Mbps. You can configure the port-channel interface as you would any Fast Ethernet interface.

After you create a port-channel interface, you assign upto four Fast Ethernet interfaces to it. For information on how to assign a Fast Ethernet interface to a port-channel interface, refer to the **channel-group** command in the interface configuration mode.

Caution The port-channel interface is the routed interface. Do not enable Layer 3 addresses on the physical Fast Ethernet interfaces. Do not assign bridge groups on the physical Fast Ethernet interfaces because doing so creates loops. Also, you must disable spanning tree.

Caution With Release 11.1(20)CC, the Fast EtherChannel supports Cisco Express Forwarding (CEF) and distributed Cisco Express Forwarding (dCEF). We recommend that you clear all explicit**iproute-cachedistributed** commands from the Fast Ethernet interfaces before enabling dCEF on the port-channel interface. Clearing the route cache gives the port-channel interface proper control of its physical Fast Ethernet links. When you enable CEF/dCEF globally, all interfaces that support CEF/dCEF are enabled. When CEF/dCEF is enabled on the port-channel interface, it is automatically enabled on each of the Fast Ethernet interfaces in the channel group. However, if you have previously disabled CEF/dCEF on the Fast Ethernet interface, CEF/dCEF is not automatically enabled. In this case, you must enable CEF/dCEF on the Fast Ethernet interface.

As you work with the **port-channel**keyword, consider the following points:

- Currently, if you want to use the Cisco Discovery Protocol (CDP), you must configure it only on the port-channel interface and not on the physical Fast Ethernet interface.
- If you do not assign a static MAC address on the port-channel interface, the Cisco IOS software automatically assigns a MAC address. If you assign a static MAC address and then later remove it, Cisco IOS software automatically assigns a MAC address.
- The **access** keyword creates an ethernet channel access interface for an IP subscriber and is specific to Cisco 7600 series routers only. For more information on access interface, see IP Subscriber Interfaces.

Using the vg-anylan Keyword

The 100VG-AnyLAN port adapter provides a single interface port that is compatible with and specified by IEEE 802.12. The 100VG-AnyLAN port adapter provides 100 Mbps over Category 3 or Category 5 cable with RJ-45 terminators and supports IEEE 802.3 Ethernet packets.

You configure the 100VG-AnyLAN port adapter as you would any Ethernet or Fast Ethernet interface. The 100VG-AnyLAN port adapter can be monitored with the IEEE 802.12 Interface MIB.

Cisco ASR 901 Series Aggregation Services Routers

The first EtherChannel interface configured becomes the bundled master for all EtherChannel interfaces in the group. That is, the MAC address of the first EtherChannel interface is the MAC address for all EtherChannel interfaces in the group. If the first EtherChannel interface is removed at any time, the second EtherChannel interface becomes the bundled master by default.

Repeat this configuration on every EtherChannel port to be bundled into a Fast Ether Channel (FEC) or Gigabit Ether Channel (GEC) group. This configuration must be present on all EtherChannel interfaces before the EtherChannel group can be configured.

Examples

Examples

The following example configures an analysis module interface when the NAM router is in router slot 1:

```
Router(config)# interface analysis-module 1/0
```

Examples The following example shows how to define asynchronous group master interface 0:

```
Router(config)# interface group-async 0
```

Examples The following example configures an interface for a content engine network module in slot 1:

```
Router(config)# interface content-engine 1/0
```

Examples The following example configures a new **ethernet2**interface on the LAN or on the WAN side of the Cisco 830 series router.

```
c837# configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.
c837(config)# interface ethernet 2
```

Examples The following example shows how to configure Ethernet port 4 on the Ethernet Interface Processor (EIP) in slot 2 on the Cisco 7500 series router:

```
Router(config)# interface ethernet 2/4
```

Examples The following example shows how to configure the profile “corp1,” which will send captured IP traffic to host “00a.8aab.90a0” at the interface “FastEthernet 0/1.” This profile is also configured to export one in every 50 packets and to allow incoming traffic only from the access control list “ham_ACL.”

```
Router(config)# ip traffic-export profile corp1
Router(config-rite)# interface FastEthernet 0/1
Router(config-rite)# bidirectional
Router(config-rite)# mac-address 00a.8aab.90a0
Router(config-rite)# outgoing sample one-in-every 50
Router(config-rite)# incoming access-list ham_acl
Router(config-rite)# exit
Router(config)# interface FastEthernet 0/0
Router(config-if)# ip traffic-export apply corp1
```

Examples The following example shows how to configure Fast Ethernet interface 0 on a Cisco 2600 series router:

```
Router(config)# interface fastethernet0/0
```
or
```
Router(config)# interface fastethernet0/0.1
```

Examples The following example shows how to configure Fast Ethernet interface 0 on a Cisco 3600 series router:

```
Router(config)# interface fastethernet0/0
```
or
```
Router(config)# interface fastethernet0/0.1
```

Examples The following example shows how to configure Fast Ethernet interface 0 for standard ARPA encapsulation (the default setting) on a Cisco 4700 series router:

```
Router(config)# interface fastethernet 0
```

Examples The following example shows how to configure Fast Ethernet interface 0 on a Cisco 7100 series router:

```
Router(config)# interface fastethernet0/0
```
or
```
Router(config)# interface fastethernet0/0.1
```

Examples The following example shows how to configure Fast Ethernet interface 6 on a Cisco 12000 series router:

```
Router(config)# interface fastethernet6/0
```
or
```
Router(config)# interface fastethernet6/0.1
```

Examples The following example shows how to configure the Gigabit Ethernet interface for slot 0, port 0:

```
Router(config)# interface gigabitethernet 0/0
```

Examples The following example shows how to specify the second interface (1) on a Gigabit Ethernet SPA installed in the first subslot of a SIP (0) installed in chassis slot 3:

```
Router(config)# interface gigabitethernet 3/0/1
```

Examples The following example shows how to enable loopback mode and assign an IP network address and network mask to the interface. The loopback interface established here will always appear to be up.

```
Router(config)# interface loopback 0
Router(config-if)# ip address 10.108.1.1 255.255.255.0
```

Examples The following example shows how to specify the single Packet OC-3 interface on port 0 of the POS OC-3 port adapter in slot 2:

```
Router(config)# interface pos 2/0
```

Examples The following example shows how to configure a partially meshed Frame Relay network. In this example, subinterface serial 0.1 is configured as a multipoint subinterface with two associated Frame Relay permanent virtual connections (PVCs), and subinterface serial 0.2 is configured as a point-to-point subinterface.

```
Router(config)# interface serial 0
Router(config-if)# encapsulation frame-relay
```

```
Router(config-if)# exit
Router(config)# interface serial 0/0.1 multipoint
Router(config-if)# ip address 10.108.10.1 255.255.255.0
Router(config-if)# frame-relay interface-dlci 42 broadcast
Router(config-if)# frame-relay interface-dlci 53 broadcast
Router(config-if)# exit
Router(config)# interface serial 0/0.2 point-to-point
Router(config-if)# ip address 10.108.11.1 255.255.255.0
Router(config-if)# frame-relay interface-dlci 59 broadcast
```

Examples

The following example shows how to create a port-channel interface with a channel group number of 1 and add two Fast Ethernet interfaces to port-channel 1:

```
Router(config)# interface port-channel 1
Router(config-if)# ip address 10.1.1.10 255.255.255.0
Router(config-if)# exit
Router(config)# interface fastethernet 1/0/0
Router(config-if)# channel-group 1
Router(config-if)# exit
Router(config)# interface fastethernet 4/0/0
Router(config-if)# channel-group 1
```

Examples

The following example configures the first interface (port 0) as a section data communications channel (SDCC) interface on a POS SPA, where the SPA is installed in the top subslot (0) of the MSC, and the MSC is installed in slot 4 of the Cisco 7304 router:

```
Router(config)# interface sdcc 4/3/0
Router(config-if)# ip address 10.1.9.2 255.255.255.0
Router(config-if)# logging event link-status
Router(config-if)# load-interval 30
Router(config-if)# no keepalive
Router(config-if)# no fair-queue
Router(config-if)# no cdp enable
```

Examples

The following example shows how to configure serial interface 0 with PPP encapsulation:

```
Router(config)# interface serial 0
Router(config-if)# encapsulation ppp
```

Examples

The following example configures the second interface (port 1) on a 4-Port 10/100 Fast Ethernet SPA for standard ARPA encapsulation (the default setting), where the SPA is installed in the bottom subslot (1) of the MSC, and the MSC is installed in slot 2 of the Cisco 7304 router:

```
Router(config)# interface fastethernet 2/1/1
```

Examples

The following example shows how to configure circuit 0 of a T1 link for PPP encapsulation:

```
Router(config)# controller t1 4/1
Router(config-controller)# circuit 0 1
Router(config-controller)# exit
Router(config)# interface serial 4/1:0
Router(config-if)# ip address 10.108.13.1 255.255.255.0
Router(config-if)# encapsulation ppp
```

Examples

The following example shows how to configure the Token Ring interface processor in slot 1 on port 0 of a Cisco 7500 series router:

```
Router(config)# interface tokenring 1/0
```

Examples

The following example shows how to specify the 100VG-AnyLAN port adapter in the first port adapter in slot 1:

```
Router(config)# interface vg-anylan 1/0/0
```

Related Commands

Command	Description
channel-group	Defines the time slots that belong to each T1 or E1 circuit.
channel-group (Fast EtherChannel)	Assigns a Fast Ethernet interface to a Fast EtherChannel group.
clear interface	Resets the hardware logic on an interface.
controller	Configures an E1, J1, T1, or T3 controller and enters controller configuration mode.
group-range	Creates a list of asynchronous interfaces that are associated with a group interface on the same device.
ip traffic-export profile	Create or edit an IP traffic export profile.
mac-address	Sets the MAC layer address.
ppp	Starts an asynchronous connection using PPP.
show controllers content-engine	Displays controller information for CE network modules.
show interfaces	Displays information about interfaces.
show interfaces	Displays information about interfaces.
show interfaces content-engine	Displays basic interface configuration information for a CE network module.
shutdown (RLM)	Shuts down all of the links under the RLM group.
slip	Starts a serial connection to a remote host using SLIP.

interface fastethernet

The **interfacefastethernet**command is now documented as the **fastethernet**keyword of the **interface** command. For more information, see the **interface** command.

interface gigabitethernet

The **interfacegigabitethernet**command is now documented as the **gigabitethernet**keyword of the **interface** command. For more information, see the interface command.

interface port-channel

The **interfaceport-channel** command is now documented as the **port-channel**keyword of the **interface** command. For more information, see the **interface** command.

interface range

To execute commands on multiple subinterfaces at the same time, use the **interfacerange** command in global configuration mode.

interface range {*type number* [[-**interface** *number*]] [,]... *type number*| **macro** *word*}

no interface range *type number*

Syntax Description

type number	Interface type and interface or subinterface number. For more information about the numbering syntax for your networking device, use the question mark (?) online help function. • You can enter any number of interface type and numbers.
- *interface-number*	(Optional) Ending interface number.
,	Allows you to configure more interface types.
macro	Specifies a macro keyword.
word	Previously defined keyword, up to 32 characters long.

Command Default

No interface range is set.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(7)XE	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2(2)DD	This command was expanded to support subinterface ranges.
12.2(4)B	This command was integrated into Cisco IOS Release 12.2(4)B.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(18)SX	This command was integrated into Cisco IOS Release 12.2(18)SX.

Release	Modification
12.2(33)SXH	The **create** keyword was added to enable the creation of VLANs that operate within a specified range of physical interfaces.

Usage Guidelines

Configuration Changes

All configuration changes made to a range of subinterfaces are saved to NVRAM, but the range itself does not get saved to NVRAM. Use the **defineinterfacerange** command to create and save a range.

You can enter the range in two ways:

- Specifying up to five interface ranges
- Specifying a previously defined macro

You can specify either the interfaces or the name of a range macro. A range must consist of the same interface type, and the interfaces within a range cannot span slots.

You cannot specify both the **interfacerange**and **macro** keywords in the same command. After creating a macro, the command does not allow you to enter additional ranges. Likewise, if you have already specified an interface range, the command does not allow you to enter a macro.

The spaces around the hyphen in the **interfacerange** command syntax are required. For example, using a Catalyst 6500 router, the command **interfacerangefastethernet1-6**is valid; the command **interfacerangefastethernet1-6**is not valid.

VLANs

When you define a Catalyst VLAN, valid values are from 1 to 4094. The last VLAN number cannot exceed 4094.

You cannot use the **interfacerange** command to create switch virtual interfaces (SVIs) in that particular range. You can use the **interfacerange** command only to configure existing VLAN SVIs within the range. To display VLAN SVIs, enter the **showrunning-config** command. VLANs not displayed cannot be used in the **interfacerange** command.

The commands entered under the**interfacerange** command are applied to all existing VLAN SVIs within the range.

You can enter the command **interfacerangecreatevlan***x-y* to create all VLANs in the specified range that do not already exist. If you are using discontiguous VLANs, you can use the **interfacerangevlan** command to configure multiple SVIs without creating unneeded SVIs and wasting interface descriptor blocks (IDBs).

After specifying a VLAN range, you can continue using the **interfacerange** command to specify another interface (**ATM**, **FastEthernet**, **GigabitEthernet**, **loopback**, **port-channel**, or **tunnel**).

Examples

Examples

The following example shows how to use the **interfacerange** command to configure a Fast Ethernet range:

```
Router(config)# interface range fastethernet 5/1 - 4
```

The following example configures the Fast Ethernet subinterfaces within the range 5/1.1 to 5/1.4 and applies the following VLAN IDs to those subinterfaces:

```
Fast Ethernet5/1.1 = VLAN ID 301 (vlan-id)
Fast Ethernet5/1.2 = VLAN ID 302 (vlan-id = 301 + 2 - 1 = 302)
Fast Ethernet5/1.3 = VLAN ID 303 (vlan-id = 301 + 3 - 1 = 303)
Fast Ethernet5/1.4 = VLAN ID 304 (vlan-id = 301 + 4 - 1 = 304)
Router(config)# interface range fastethernet 5/1 - 4

Router(config-if-range)# encapsulation dot1q 301
Router(config-if-range)# no shutdown

Router(config-if)#
*Oct  6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/1.1, changed state to up
*Oct  6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/1.2, changed state to up
*Oct  6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/1.3, changed state to up
*Oct  6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/1.4, changed state to up
*Oct  6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/1.1, changed
 state to up
*Oct  6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/1.2, changed
 state to up
*Oct  6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/1.3, changed
 state to up
*Oct  6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/1.4, changed
 state to up
```

Examples

The following example shows how to set a Gigabit Ethernet range:

```
Router(config)# interface range gigabitethernet 1/1 - 6
```

Examples

The following example shows how to use the loopback interface:

```
Router(config)# interface range loopback 34567
```

Examples

The following example shows how to use the tunnel interface:

```
Router(config)# interface range tunnel 55555
```

Examples

The following example shows how to use the port-channel interface:

```
Router(config)# interface range port-channel 100
```

Examples

The following example shows how to set a VLAN:

```
Router(config)# interface range vlan 123
```

The following example shows how to create a range of VLANs:

```
Router(config)# interface range create vlan 4
```

Examples

The following example shows how to execute a range macro:

```
Router(config)# interface range macro macro1
```

Related Commands

Command	Description
define interface range	Defines an interface range macro.
encapsulation dot1q	Applies a unique VLAN ID to each subinterface within the range.
interface vlan	Configures a VLAN interface.

l2 vfi manual through loopback (PA-MC-8TE1 + port adapter)

l2protocol-tunnel

To enable the protocol tunneling on an interface and specify the type of protocol to be tunneled, use the **l2protocol-tunnel** command in global or interface configuration mode. To disable protocol tunneling, use the **no** form of this command.

Global Configuration

l2protocol-tunnel [**cos cos-value**| **global**| **mac-address**]

no l2protocol-tunnel

Interface Configuration

l2protocol-tunnel [**cdp**| **lldp**| **stp**| **vtp**]

no l2protocol-tunnel

Syntax Description

cos cos-value	(Optional) Specifies a class of service (CoS) value globally on all ingress Layer 2 protocol tunneling ports.
global	(Optional) Displays global settings.
mac-address	(Optional) Displays L2PT MAC address.
cdp	(Optional) Enables Cisco Discovery Protocol (CDP) tunneling.
lldp	(Optional) Enables Link Layer Discovery Protocol (LLDP) tunneling.
stp	(Optional) Enables Spanning Tree Protocol (STP) tunneling.
vtp	(Optional) Enables VLAN Trunking Protocol (VTP) tunneling.

Command Default

Disabled

Command Modes

Global configuration (config)

Interface configuration (config-if)

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.2(2)T	This command was modified. The **lldp**, cos, global, and mac-address keywords were added.

Usage Guidelines

On all the service provider edge switches, you must enable PortFast BPDU filtering on the 802.1Q tunnel ports by entering these commands:

```
Router(config-if)# spanning-tree bpdufilter enable
Router(config-if)# spanning-tree portfast
```

Note PortFast BPDU filtering is enabled automatically on tunnel ports.

If you do not specify a protocol, all protocols are tunneled.

You can configure protocol tunneling on VLAN and trunk interfaces.

You must enter the **switchport** command once without any keywords to configure the LAN port as a Layer 2 interface before you can enter additional **switchport** commands with keywords. This action is required only if you have not entered the **switchport** command for the interface.

Examples

This example shows how to enable a tunneling protocol on an interface:

```
Router> enable
Router# configure terminal
Router#(config)interface FastEthernet 0/0
Router(config-if)# l2protocol-tunnel cdp
```

This example shows how to disable a tunneling protocol on an interface:

```
Router> enable
Router# configure terminal
Router#(config)interface fastEthernet 4/0
Router(config-if)# no l2protocol-tunnel
Protocol tunneling disabled on interface fastEthernet 4/1
```

Related Commands

Command	Description
show l2protocol-tunnel	Displays the protocols that are tunneled on an interface or on all interfaces.

Command	Description
switchport	Modifies the switching characteristics of the Layer 2-switched interface.

l2protocol-tunnel cos

To specify a class of service (CoS) value globally on all ingress Layer-2 protocol tunneling ports, use the **l2protocol-tunnelcos**command in global configuration mode. To return to the default , use the **no** form of this command.

l2protocol-tunnel cos *cos-value*

no l2protocol-tunnel cos

Syntax Description

cos-value	CoS value; valid values are from 0 to 7.

Command Default

The *cos-value* is **5**

Command Modes

Global configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The *cos-value* is the CoS value that you assign to the PDUs on a Layer 2-protocol tunnel port before tunneling the PDUs through the service-provider network.

You can specify a CoS value globally on all ingress Layer 2-protocol tunneling ports. Because the CoS value applies to all ingress tunneling ports, all encapsulated PDUs that are sent out by the Cisco 7600 series router have the same CoS value.

On all the service-provider edge switches, you must enable PortFast BPDU filtering on the 802.1Q tunnel ports by entering these commands:

```
Router(config-if)# spanning-tree bpdufilter enable
Router(config-if)# spanning-tree portfast
```

Note PortFast BPDU filtering is enabled automatically on tunnel ports.

Examples

This example shows how to specify a CoS value on all ingress Layer 2-protocol tunneling ports:

```
Router(config)# l2protocol-tunnel cos 6
Router(config)#
```

Related Commands

Command	Description
show l2protocol-tunnel	Displays the protocols that are tunneled on an interface or on all interfaces.

lacp port-priority

To set the priority for a physical interface, use the **lacp port-priority** command in interface configuration mode. To return to the default setting, use the **no** form of this command.

lacp port-priority *priority*

no lacp port-priority

Syntax Description

priority	Integer from 1 to 65535 that indicates the priority for the physical interface. The default is 32768. • On the Cisco ASR 1000 series router, the range is 0 to 65535.

Command Default

The default port priority is set.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.1(13)EW	This command was introduced on the Cisco Catalyst 4500 series switches.
12.2(14)SX	Support for this command on the Supervisor Engine 720 was integrated into Cisco IOS Release12.2(14)SX.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was integrated into Cisco IOS Release12.2(17d) SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
15.1(2)SNG	This command was implemented on the Cisco ASR 901 Series Aggregation Services Router.

Usage Guidelines

You may assign a port priority to each port on a device running Link Aggregation Control Protocol (LACP). You can specify the port priority by using the **lacp port-priority** command at the command-line interface (CLI) or use the default port priority (32768) that is carried as part of the LACP protocol data unit (PDU) exchanged with the partner. Port priority is used to decide which ports should be put in standby mode when a hardware limitation or the **lacp max-bundle** command configuration prevents all compatible ports from aggregating. Priority is supported only on port channels with LACP-enabled physical interfaces.

Note A high priority number means a low priority.

Port priority together with port number form a port identifier.

To verify the configured port priority, issue the **show lacp** command.

Examples

This example shows how to set a priority of 23700 for an interface:

```
Device> enable
Device#  configure terminal
Device(config)#  interface ethernet0/0
Device(config-if)# lacp port-priority 23700
Device(config-if)#
```

Related Commands

Command	Description
channel-group	Assigns and configures an EtherChannel interface to an EtherChannel group.
debug lacp	Enables debugging of LACP activities.
lacp max-bundle	Defines the maximum number of active bundled LACP ports allowed in a port channel.
lacp system-priority	Sets the priority of the system.
show lacp	Displays information about LACP activity on the device.

lacp system-priority

To set the priority for a system, use the **lacp system-priority** command in global configuration mode. To return to the default setting, use the **no** form of this command.

lacp system-priority *priority*

no lacp system-priority

Syntax Description

priority	Integer from 1 to 65535 that indicates the priority for the system. The default is 32768. • On the Cisco ASR 1000 series router, the range is 0 to 65535.

Command Default

The default system priority is set.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.1(13)EW	This command was introduced on the Cisco Catalyst 4500 series switches.
12.2(14)SX	Support for this command on the Supervisor Engine 720 was integrated into Cisco IOS Release12.2(14)SX.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was integrated into Cisco IOS Release12.2(17d) SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
15.1(2)SNG	This command was implemented on the Cisco ASR 901 Series Aggregation Services Router.

Usage Guidelines

You can assign a system priority to each device running Link Aggregation Control Protocol (LACP). You can specify the system priority by using the **lacp system-priority** command at the command-line interface (CLI) or use the default system priority (32768) that is carried as part of the LACP protocol data unit (PDU) exchanged with the partner. System priority is used with the MAC address of the device to form the system ID and also is used during negotiation with other systems. Priority is supported only on port channels with LACP-enabled physical interfaces.

Note A high priority number means a low priority.

To verify the configured system priority, issue the **show lacp** command.

Examples

The following example shows how to set a system priority of 25500 for a device:

```
Router> enable
Router# configure terminal
Router(config)# lacp system-priority 25500
```

Related Commands

Command	Description
channel-group	Assigns and configures an EtherChannel interface to an EtherChannel group.
debug lacp	Enables debugging of LACP activities.
lacp port-priority	Sets the priority of a port.
show lacp	Displays information about LACP activity on the device.

link state group

To configure the link state group, use the **linkstategroup** command in interface configuration mode.

link state group [*number*] {**upstream**| **downstream**}

Syntax Description

number	Specifies a link-state group. The acceptable range of group number is between 1 to 10 and the default value is 1.
upstream	Configures the interface as an upstream interface in the group.
downstream	Configures the interface as a downstream interface in the group.

Command Default

The default **linkstategroup**number is 1.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
15.1(1)S	This command was introduced.

Usage Guidelines

Link State Ttracking (LST), also known as trunk failover, is a feature that binds the link state of multiple interfaces. When you configure LST for the first time, add upstream interfaces to the link state group before adding the downstream interface, otherwise the downstream interfaces would move into error-disable mode. The maximum number of link state groups configurable is 10. These are the limitations:

- An interface can only be an upstream or downstream interface.
- An interface cannot be part of more than one link state tracking group.

Examples

The following example shows how to configure the link state group number.

```
Router# configure terminal
Router(config)# link state track 1
Router(config)# interface gigabitethernet3/1
Router(config-if)# link state group 1 upstream
Router(config-if)# interface gigabitethernet3/3
Router(config-if)# link state group 1 upstream
Router(config-if)# interface gigabitethernet3/5
Router(config-if)# link state group 1 downstream
```

```
Router(config-if)# interface gigabitethernet3/7
Router(config-if)# link state group 1 downstream
```

Related Commands

Command	Description
link state track	Configures the link-state track number.
show link state group	Displays the link-state group information.

link state track

To configure a link state tracking number, use the **linkstatetrack** command in global configuration mode. To restore the default **linkstatetrack**number, use the no form of this command.

link state track *number*

no link state track *number*

Syntax Description

number	Specifies the link state tracking number. The acceptable range is between 1 and 10 and the default value is 1.

Command Default

The default link state track number is 1.

Command Modes

Global configuration (config)

Command History

Release	Modification
15.1(1)S	This command was introduced.

Usage Guidelines

Link State Ttracking (LST), also known as trunk failover, is a feature that binds the link state of multiple interfaces. When you configure LST for the first time, add upstream interfaces to the link state group before adding the downstream interface, otherwise the downstream interfaces would move into error-disable mode.

Examples

The following example shows how to configure the link state tracking number.

```
Router# configure terminal
Router(config)# link state track 1
```

Related Commands

Command	Description
link state group	Configures the link state group and the interface as either an upstream or downstream interface in the group.
show link state group	Displays the link state group information.

loopback (T1 interface) through nrzi-encoding

mdix auto

To enable automatic media-dependent interface with crossover detection, use the **mdixauto** command in interface configuration mode. To turn automatic detection off, use the **no** form of this command.

mdix auto

no mdix auto

Syntax Description

This command has no arguments or keywords.

Command Default

Enabled

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(17a)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

This command is supported on all 10/100 and 10/100/1000 modules except for the following modules:

- WS-X6248-RJ45
- WS-X6248-TELCO
- WS-X6348-RJ-45
- WS-X6348-RJ-21
- WS-X6148-RJ-45
- WS-X6148-RJ-21

Examples

This example shows how to enable automatic media-dependent interface with crossover detection:

```
Router(config-if)# mdix auto
Router(config-if)
```

This example shows how to disable automatic media-dependent interface with crossover detection:

```
Router(config-if) no mdix auto
Router(config-if)
```

Related Commands

Command	Description
show interfaces	Displays the status and traffic statistics for the interfaces in the chassis.

O through R

port-channel hash-distribution

To set the hash distribution algorithm method, use the port-channel hash-distribution command in global configuration mode. To return to the default settings, use the **no** or **default** form of this command.

port-channel hash-distribution {**adaptive**| **fixed**}

{**no**| **default**} **port-channel hash-distribution**

Syntax Description

adaptive	Specifies selective distribution of the bundle select register among the port-channel members.
fixed	Specifies fixed distribution of the bundle select register among the port-channel members.
default	Specifies the default setting.

Command Default

The hash distribution algorithm method is set to **fixed.**

Command Modes

Global configuration (config)

Command History

Release	Modification
12.2(33)SXH	This command was introduced.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.

Usage Guidelines

The EtherChannel load distribution algorithm uses the bundle select register in the port ASIC to determine the port for each outgoing packet. When you use the **adaptive** algorithm, it does not require the bundle select register to be changed for existing member ports. When you use the **fixed** algorithm and you either add or delete a port from the EtherChannel, the switch updates the bundle select register for each port in the EtherChannel. This update causes a short outage on each port.

Note When you change the algorithm, the change is applied at the next member link event. Example events include link down, up, addition, deletion, no shutdown, and shutdown. When you enter the command to change the algorithm, the command console issues a warning that the command does not take effect until the next member link event.

Examples

The following example shows how to set the hash distribution algorithm method to adaptive:

```
Router(config)# port-channel hash-distribution adaptive
```

power inline

To determine how inline power is applied to the device on the specified switch port, use the **powerinline** command in interface configuration mode. To return the setting to its default, use the **no** form of this command.

power inline {**auto** [**max** *max-milliwatts*]| **never**| **police**| **static** [**max** *max-milliwatts*]}

no power inline [police]

Cisco Integrated Services Routers Generation 2 (ISR G2) with Cisco Gigabit EtherSwitch enhanced high-speed WAN interface cards (EHWICs)

power inline {**auto**| **never**| **port max** *max-milliwatts*}

no power inline {**auto**| **never**| **port**}

Syntax Description

auto	Turns on the device discovery protocol and applies power to the device, if found.
max *max-milliwatts*	(Optional) Specifies the maximum amount of power, in milliwatts, that a device connected to a port can consume. Range: 4000 to 16800. Default: 15400.
never	Turns off the device discovery protocol and stops supplying power to the device.
police	Turns on inline power policing; optional if entering the **no** form of the command. Default is disabled.
static	Allocates power from the system power pool to a port.
port max *max-milliwatts*	Specifies the maximum power allocated to the port. The maximum power can be set between 4,000 to 20,000 milliwatts.

Power is applied when a telephone is detected on the port (**auto**).*max-milliwatts* is 15400 milliwatts. Inline power policing is disabled.

Command Default

Power is applied when a telephone is detected on the port (auto). The maximum power limit is 20000 milliwatts. Inline power policing is disabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.0(5)XU	This command was introduced.
12.2(2)XT	This command was integrated to support switchport creation on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T to support switchport creation .
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17b)SXA	This command was changed to include the **static** and **max***max-milliwatts* keywords and arguments.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Cisco IOS Release 12.2(17d)SXB.
12.2(33)SXH	This command was changed to include the **police** keyword .
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH2	This command was changed to increase the *max-watts* maximum to 16800 milliwatts for the WS-F6K-48-AF and the WS-F6K-GE48-AF modules. The default setting remains 15400 milliwatts. See the "Usage Guidelines" section for additional information.
15.1(2)T	This command was modified. The **portmax**keyword and *max-milliwatts* argument were added.

Usage Guidelines

The **police**keyword appears if you have a WS-F6K-48-AF or other inline power daughter card that supports power monitoring and inline power policing.

Inline power is supported only on switch ports that are connected to an IP phone. Before you enable inline power on a switch port, you must enter the **switchport** command.

The following information applies to WS-F6K-48-AF and WS-F6K-GE48-AF inline power cards:

- In Cisco IOS Release 12.2(33)SXH2 and later releases, the configurable range of maximum power using the max keyword is 4000 to 16800 milliwatts. For earlier releases, the configurable range for maximum power is 4000 to 15400 milliwatts. For all releases, if no maximum power level is configured, the default maximum power is 15400 milliwatts.

Note To support a large number of inline-powered ports using power levels above 15400 milliwatts on an inline power card, we recommend using the static keyword so that the power budget is deterministic.

- In Cisco IOS Release 12.2(33)SXH2 and later releases, when you enter the auto keyword and CDP is enabled on the port, an inline-powered device that supports CDP can negotiate a power level up to 16800 milliwatts unless a lower maximum power level is configured. For earlier releases, the inline-powered device can negotiate a power level up to 15400 milliwatts or the configured maximum power level, if it is configured lower than 15400 milliwatts.

Cisco ISR G2 with Cisco Gigabit EHWICs

- The **portmax**keyword and *max-milliwatts* argument are available only on the Firebee cards with Power-over-Ethernet (PoE).

Examples

The following example shows how to set the inline power to the off mode on a switch port:

```
Router(config)# interface fastethernet5/1
Router(config-if)# switchport
Router(config-if)# power inline never
```

The following example shows how to allocate power from the system power pool to a switch port:

```
Router(config)# interface fastethernet5/1
Router(config-if)# switchport
Router(config-if)# power inline static max 15000
```

The following example shows how to turn on inline power policing to a switch port:

```
Router(config)# interface gigabitethernet6/3
Router(config-if)# switchport
Router(config-if)# power inline police
```

Examples

The following example shows how to turn on inline power to a switch port:

```
Router(config)# interface gigabitethernet
0/1/3
Router(config-if)#
power inline
auto{!-condition!}
```

The following example shows how to set maximum inline power to a switch port:

```
Router(config)# interface
 gigabitethernet
0/1/3
```

The following example shows how to disable inline power to the switch port:

```
Router(config)# interface
 gigabitethernet

0/1/3
Router(config-if)# power inline
 never{!-condition!}
```

Related Commands

Command	Description
show power inline	Displays the power status for the specified port or for all ports.

Command	Description
switchport priority extend	Determines how the telephone connected to the specified port handles priority traffic received on its incoming port.
switchport voice vlan	Configures the voice VLAN on the port.

remote-span

To configure a virtual local area network (VLAN) as a remote switched port analyzer (RSPAN) VLAN, use the **remote-span** command in config-VLAN mode. To remove the RSPAN designation, use the **no** form of this command.

remote-span

no remote-span

Syntax Description

This command has no arguments or keywords.

Command Default

This command has no default settings.

Command Modes

Config-VLAN mode

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

This command is not supported in the VLAN database mode.

You can enter the **show vlan remote-span** command to display the RSPAN VLANs in the Cisco 7600 series router.

Examples

This example shows how to configure a VLAN as an RSPAN VLAN:

```
Router(config-vlan)# remote-span
Router(config-vlan)
```

This example shows how to remove the RSPAN designation:

```
Router(config-vlan)# no remote-span
Router(config-vlan)
```

Related Commands

Connect	Description
show vlan remote-span	Displays a list of RSPAN VLANs.

service-module t1 linecode through show controllers satellite

show cable-diagnostics tdr

To display the test results for the Time Domain Reflectometry (TDR) cable diagnostics, use the **showcable-diagnosticstdr**command in privileged EXEC mode.

show cable-diagnostics tdr interface *interface interface-number*

Syntax Description

interface *interface*	Specifies the interface type; valid values are**fastethernet** and **gigabitethernet**.
interface-number	Module and port number.

Command Default

This command has no default settings.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(17a)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.

12.2(18)SXD	The output was changed as follows:
	• The Local Pair field was changed to the Pair field. The local pair designations were changed as follows:
	  • Pair A to Pair 1-2
	  • Pair B to Pair 3-4
	  • Pair C to Pair 5-6
	  • Pair D to Pair 7-8
	• The Remote Pair field was removed.
	• The Channel field was added to display the pair designation and are as follows:
	  • Pair A
	  • Pair B
	  • Pair C
	  • Pair D

Release	Modification
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The **showcable-diagnosticstdr** command is supported on specific modules. See the Release Notes for Cisco IOS Release 12.2 SX on the Catalyst 6500 and Cisco 7600 Supervisor Engine 720, Superivsor Engine 32, and Supervisor Engine 2 for the list of the modules that support TDR.

In the event of an open or shorted cable, the accuracy of length of where the cable is open or shorted is plus or minus 2 meters.

The pair length can be displayed in meters (m), centimeters (cm), or kilometers (km).

If the TDR test has not been run on the port, the following message is displayed:

```
TDR test was never run on Gi2/12
```

Examples

This example shows how to display the information about the TDR test:

```
Router# show cable-diagnostics tdr interface gigabitethernet 8/1
TDR test last run on: February 25 11:18:31
Interface Speed Pair Cable length        Distance to fault   Channel Pair status
--------- ----- ---- ------------------- ------------------- ------- ------------
Gi8/1     1000  1-2  1    +/- 6  m       N/A                 Pair B  Terminated
                3-4  1    +/- 6  m       N/A                 Pair A  Terminated
                5-6  1    +/- 6  m       N/A                 Pair C  Terminated
                7-8  1    +/- 6  m       N/A                 Pair D  Terminated
```

The table below describes the fields in the **showcable-diagnosticstdr**command output.

Table 5: show cable-diagnostics tdr Command Output Fields

Field	Description
Interface	Interface tested.
Speed	Current line speed.
Pair	Local pair name.
Cable Length	Cable length and accuracy. The accuracy unit is displayed in meters (m), centimeters (cm), or kilometers (km).
Channel	Pair designation.

Field	Description
Pair status	Pair status displayed is one of the following: • Terminated--The link is up. • Shorted--A short is detected on the cable. • Open--An opening is detected on the cable. • Not Completed--The test on the port failed. • Not Supported--The test on the port is not supported. • Broken--The pair is bad--either open or shorted. • ImpedanceMis--The impedance is mismatched. • InProgress--The diagnostic test is in progress.

Related Commands

Command	Description
clear cable-diagnostics tdr	Clears a specific interface or clear all interfaces that support TDR.
test cable-diagnostics	Tests the condition of 10-Gigabit Ethernet links or copper cables on 48-port 10/100/1000 BASE-T modules.

showcontrollersserialthroughshowhw-module slot proc cpu

show etherchannel

To display EtherChannel information for a channel, use the **showetherchannel** command in privileged EXEC mode.

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

show etherchannel [*channel-group*] {**port-channel**| **brief**| **detail**| **summary**| **port**| **load-balance**}

Cisco Catalyst Switches

show etherchannel [*channel-group*] {**port-channel**| **brief**| **detail**| **summary**| **port**| **load-balance**| **protocol**} [*expression*]

Syntax Description

channel -group	(Optional) Number of the channel group. If you do not specify a value for the *channel -group* argument, all channel groups are displayed.
port -channel	Displays port channel information.
brief	Displays a summary of EtherChannel information.
detail	Displays detailed EtherChannel information.
summary	Displays a one-line summary per channel group.
port	Displays EtherChannel port information.
load -balance	Displays load-balance information.
protocol	Displays the enabled protocol.
expression	(Optional) Expression in the output to use as a reference point.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.0(7)XE	This command was introduced on Cisco Catalyst 6000 family switches.
12.1(3a)E3	This command was modified. The number of valid values for the *channel -group* argument were changed.

Release	Modification
12.1(5c)EX	This command was modified. The number of valid values for the *channel-group* argument were changed.
12.2(2)XT	This command was modified to support switchport creation on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(14)SX	This command was implemented on the Supervisor Engine 720.
12.2(17a)SX1	This command was modified. The output of the **showetherchannelload-balance** command was changed to include IPv6 information. The display was changed to include Multiprotocol Label Switching (MPLS) information.
12.2(17d)SXB	This command was modified to support the Supervisor Engine 2.
12.2(8)T	This command was modified to support switchport creation.
12.2(33)SXH	This command was modified. The output of the **showetherchannelport-channel** and the **showetherchanneldetail**commands was changed to include Link Aggregation Control Protocol (LACP) fast switchover status. The number of valid values for the *channel -group* argument was changed.
12.2(33)SRC	This command was modified. The output of the **showetherchannelport-channel** and the **showetherchanneldetail**commands was changed to show the status of the LACP Single Fault Direct Load Balance Swap feature, to show the last applied hash distribution algorithm, and to include LACP fast switchover status.
12.2(33)SXI3	This command was modified. The output of the **showetherchannelsummary**, **showetherchannelport-channel**, and **showetherchanneldetail** commands was changed to show the standalone disable option.

Usage Guidelines

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

The *channel-group* argument supports six EtherChannels and eight ports in each channel.

If you do not specify a value for the *channel-group* argument, all channel groups are displayed.

Cisco Catalyst Switches

The number of valid values for the *channel-group* argument depends on the software release. For software releases prior to Cisco IOS Release 12.1(3a)E3, valid values are from 1 to 256; for Cisco IOS Release 12.1(3a)E3, 12.1(3a)E4, and 12.1(4)E1, valid values are from 1 to 64. Cisco IOS Release 12.1(5c)EX and later support a maximum of 64 values ranging from 1 to 256. Cisco IOS Release 12.2(33)SXH supports a maximum of 64 values ranging fro m 1 to 282.

If you do not specify a value for the *channel-group* argument, all channel groups are displayed.

In the output, the Passive port list field is displayed for Layer 3 port channels only. This field means that the physical interface, which is still not up, is configured to be in the channel group (and indirectly in the only port channel in the channel group).

The *channel-group*values from 257 to 282 are supported on the Catalyst 6500 series Cisco Services Module (CSM) and the Catalyst 6500 series Firewall Services Module (FWSM) only.

In the output, the Passive port list field is displayed for Layer 3 port channels only. This field means that the physical interface, which is still not up, is configured to be in the channel group (and indirectly is the only port channel in the channel group).

If the interface is configured as part of the channel in ON mode, the**showetherchannelprotocol** command displays Protocol: - (Mode ON).

In the output of the **showetherchannelsummary** command, the following conventions apply:

- In the column that displays the protocol that is used for the channel, if the channel mode is ON, a hyphen (-) is displayed.
- For LACP, multiple aggregators are supported. For example, if two different bundles are created, Po1 indicates the primary aggregator, and Po1A and Po1B indicates the secondary aggregators.

In the output of the **showetherchannelload-balance** command, the following conventions apply:

- For EtherChannel load balancing of IPv6 traffic, if the traffic is bridged onto an EtherChannel (for example, it is a Layer 2 channel and traffic in the same VLAN is bridged across it), the traffic is always load balanced by the IPv6 addresses or src, dest, or src-dest, depending on the configuration. For this reason, the switch ignores the MAC/IP/ports for bridged IPv6 traffic. If you configure src-dst-mac, the src-dst-ip(v6) address is displayed. If you configure src-mac, the src-ip(v6) address is displayed.
- IPv6 traffic that is routed over a Layer 2 or a Layer 3 channel is load balanced based on MAC addresses or IPv6 addresses, depending on the configuration. The MAC/IP and the src/dst/src-dst are supported, but load balancing that is based on Layer 4 ports is not supported. If you use the **port** keyword, the IPv6 addresses or either src, dst, or src-dst, is displayed.

Examples

Examples

The following example shows how to display the enabled protocol:

```
Router# show etherchannel protocol
Channel-group listing:
                -----------------------
Group: 12
----------
Protocol:  PAgP
Group: 24
----------
Protocol:   -  (Mode ON)
Router#
```

Examples

The following example shows how to display port channel information for a specific group:

```
Router# show etherchannel 12 port-channel
Group: 12
----------
               Port-channels in the group:
               ----------------------
Port-channel: Po1
------------
Age of the Port-channel   = 143h:01m:12s
Logical slot/port   = 14/1          Number of ports = 2
GC                  = -             HotStandBy port = null
```

```
Port state          = Port-channel Ag-Inuse
Protocol            = LACP
Fast-switchover     = enabled
Ports in the Port-channel:
Index   Load   Port    EC state
------+------+------+-----------
  0     55     Fa4/1   active
  1     AA     Fa4/2   active
Time since last port bundled:    16h:28m:58s    Fa4/1
Time since last port Un-bundled: 16h:29m:00s    Fa4/4
```

The following example shows that direct load swapping is enabled.

```
Router# show etherchannel 15 port-channel
               Port-channels in the group:
Port-channel: Po15    (Primary Aggregator)
Age of the Port-channel   = 0d:18h:16m:49s
Logical slot/port   = 14/7          Number of ports = 1
HotStandBy port = null
Port state              = Port-channel Ag-Inuse
Protocol                =   LACP
! The following line of output is added with support
of the LACP Single Fault Direct Load Swapping feature. !
Direct Load Swap = enabled
Ports in the Port-channel:
Index   Load   Port     EC state        No of bits
------+------+------+-----------------+-----------
  0     FF     Fa4/1    Active    8
Time since last port bundled:    0d:00h:06m:12s    Fa4/1
```

Examples

The following examples show how to display load-balancing information:

```
Router#
 show etherchannel load-balance
Source XOR Destination mac address
Router#
 show etherchannel load-balance
EtherChannel Load-Balancing Configuration:
        dst-mac
        mpls label-ip
EtherChannel Load-Balancing Addresses Used Per-Protocol:
Non-IP: Destination MAC address
  IPv4: Destination MAC address
  IPv6: Destination MAC address (routed packets)
        Destination IP address (bridged packets)
  MPLS: Label or IP
```

Examples

The following example shows how to display a summary of information for a specific group:

```
Router#
show etherchannel 1 brief
Group state = L3
Ports: 2   Maxports = 8
port-channels: 1 Max port-channels = 1
Partner's information:
```

The following example shows the hash distribution algorithm that was last applied:

```
Router# show etherchannel
 10 summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      N - not in use, no aggregation
        f - failed to allocate aggregator
<snip>
```

```
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
10     Po10(RU)        LACP      Gi3/7(P)       Gi3/9(P)
! The following line of output is added with support
of the EtherChannel Load Distribution feature. !
Last applied Hash Distribution Algorithm: Fixed
Router#
```

Examples The following example shows how to display detailed information for a specific group:

```
Router#
show etherchannel 12 detail
Group state = L2
Ports: 1   Maxports = 8
Port-channels: 1 Max Port-channels = 1
Protocol:   PAgP
Fast-switchover = enabled
                Ports in the group:
                -------------------
Port: Fa5/2
------------
Port state    = Down Not-in-Bndl
Channel group = 12          Mode = Desirable-Sl     Gcchange = 0
Port-channel  = null        GC   = 0x00000000          Pseudo port-channel = Po1
2
Port index    = 0           Load = 0x00        Protocol =   PAgP
Flags:  S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs
        A - Device is in active mode       P - Device is in passive mode
Local information:
                          LACP Port    Admin     Oper    Port     Port
Port      Flags   State     Priority      Key      Key     Number   State
Fa4/1     SA      bndl      32768         100      100     0xc1     0x75
Partner's information:
         Partner               Partner               Partner
Port     System ID             Port Number    Age    Flags
Fa4/1    8000,00b0.c23e.d861    0x81            14s    SP
         LACP Partner    Partner     Partner
         Port Priority   Oper Key    Port State
         32768            128         0x81
Age of the port in the current state: 16h:27m:42s
                Port-channels in the group:
                ----------------------
Port-channel: Po12
------------
Age of the Port-channel   = 04d:02h:52m:26s
Logical slot/port   = 14/1          Number of ports = 0
GC                  = 0x00000000      HotStandBy port = null
Port state          = Port-channel Ag-Not-Inuse
Protocol            =   PAgP
```

Note When LACP 1:1 redundancy is configured, the **showetherchanneldetail** command also displays fast-switchover status information.

Examples The following example shows how to display a one-line summary per channel group:

```
Router#
show etherchannel summary
U-in use  I-in port-channel   S-suspended   D-down  i-stand-alone  d-default
Group Port-channel  Ports
----- ------------  ----------------------------------------------------------
1     Po1(U)        Fa5/4(I)  Fa5/5(I)
2     Po2(U)        Fa5/6(I)  Fa5/7(I)
```

```
255                 Fa5/9(i)
256                 Fa5/8(i)
```

Examples

The following example shows how to display EtherChannel port information for all ports and all groups:

```
Router#
show etherchannel port
                Channel-group listing:
                ----------------------
Group: 1
----------
                Ports in the group:
                -------------------
Port: Fa5/4
------------
Port state    = EC-Enbld Down Not-in-Bndl Usr-Config
Channel group = 1           Mode = Desirable     Gcchange = 0
Port-channel  = null        GC   = 0x00000000    Psudo-agport = Po1
Port indx     = 0           Load = 0x00
Flags:  S - Device is sending Slow hello.  C - Device is in Consistent state.
        A - Device is in Auto mode.        P - Device learns on physical port.
Timers: H - Hello timer is running.        Q - Quit timer is running.
        S - Switching timer is running.    I - Interface timer is running.
Local information:
                              Hello    Partner  PAgP     Learning  Group
Port      Flags State   Timers  Interval Count   Priority   Method  Ifindex
Fa5/4     d     U1/S1           1s       0        128        Any      0

Age of the port in the current state: 02h:40m:35s
Port: Fa5/5
------------
Port state    = EC-Enbld Down Not-in-Bndl Usr-Config
Channel group = 1           Mode = Desirable     Gcchange = 0
Port-channel  = null        GC   = 0x00000000    Psudo-agport = Po1
Port indx     = 0           Load = 0x00
Flags:  S - Device is sending Slow hello.  C - Device is in Consistent state.
        A - Device is in Auto mode.        P - Device learns on physical port.
Timers: H - Hello timer is running.        Q - Quit timer is running.
        S - Switching timer is running.    I - Interface timer is running.
```

Examples

The following example shows how to display the information about the EtherChannel port for a specific group:

```
Router#
show etherchannel 1 port
                Channel-group listing:
                ----------------------
Group: 1
----------
                Ports in the group:
                -------------------
Port: Fa5/4
------------
Port state    = EC-Enbld Down Not-in-Bndl Usr-Config
Channel group = 1           Mode = Desirable     Gcchange = 0
Port-channel  = null        GC   = 0x00000000    Psudo-agport = Po1
Port index    = 0           Load = 0x00        Protocol =   LACP
Flags:  S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs
        A - Device is in active mode       P - Device is in passive mode
Local information:
                              LACP Port    Admin     Oper    Port     Port
Port      Flags   State     Priority      Key      Key     Number   State
Fa5/4     SA      bndl      32768         100      100     0xc1     0x75
Partner's information:
         Partner               Partner               Partner
Port     System ID             Port Number    Age    Flags
Fa5/4    8000,00b0.c23e.d861   0x81            14s    SP
```

```
         LACP Partner    Partner     Partner
         Port Priority   Oper Key    Port State
         32768            128         0x81
Age of the port in the current state: 04d:02h:57m:38s
```

Examples

The following example shows the **showetherchannelsummary** command output with a port in suspended state:

```
Router# show etherchannel 42 summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
Number of channel-groups in use: 8
Number of aggregators:           8
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
2      Po42(SU)        LACP      Fa1/17(s)  Fa1/18(P)  Fa1/19(P)  Fa1/20(P)
```

The following example shows the **showetherchannelport-channel** command output with the status of Standalone Disable option:

```
Router# show etherchannel 42 port-channel
                Port-channels in the group:
                ----------------------
Port-channel: Po42    (Primary Aggregator)
------------
Age of the Port-channel   = 0d:21h:28m:22s
Logical slot/port   = 14/42          Number of ports = 3
HotStandBy port = null
Port state          = Port-channel Ag-Inuse
Protocol            =   LACP
Fast-switchover     = disabled
Load share deferral = disabled
Standalone Disable  = enabled
Ports in the Port-channel:
Index   Load      Port          EC state       No of bits
------+------+------------+------------------+-----------
 2      49         Fa1/18             Active   3
 1      92         Fa1/19             Active   3
 3      24         Fa1/20             Active   2
Time since last port bundled:    0d:03h:37m:07s    Fa1/18
Time since last port Un-bundled: 0d:03h:34m:27s    Fa1/17
Last applied Hash Distribution Algorithm: Fixed
```

The following example shows the **showetherchanneldetail** command output with the status of Standalone Disable option:

```
Router# show etherchannel 42 detail

Group state = L2
Ports: 4   Maxports = 16
Port-channels: 1 Max Port-channels = 16
Protocol:   LACP
Minimum Links: 2
Standalone Disable: enabled
                Ports in the group:
                -------------------
Port: Fa1/17
------------
Port state    = Up Cnt-bndl Suspend Not-in-Bndl
Channel group = 42           Mode = Active      Gcchange = -
Port-channel  = null        GC   =   -         Pseudo port-channel = Po2
Port index    = 0           Load = 0x00        Protocol =   LACP
```

```
Flags:  S - Device is sending Slow LACPDUs   F - Device is sending fast LACPDUs.
        A - Device is in active mode.        P - Device is in passive mode.
Local information:
                            LACP port     Admin     Oper    Port        Port
Port      Flags   State     Priority      Key       Key     Number      State
Fa1/17    FP      susp      1             0x2       0x2     0x112       0x82
Partner's information:
          Partner Partner   LACP Partner  Partner   Partner  Partner     Partner
Port      Flags   State     Port Priority Admin Key Oper Key Port Number Port State
Fa1/17    FP      susp      1             0x0       0x2      0x312       0x36
Age of the port in the current state: 0d:03h:44m:04s
Port: Fa1/18
------------
Port state    = Up Mstr In-Bndl
Channel group = 42           Mode = Active      Gcchange = -
Port-channel  = Po2          GC   =   -         Pseudo port-channel = Po2
Port index    = 2            Load = 0x49        Protocol =   LACP
Flags:  S - Device is sending Slow LACPDUs   F - Device is sending fast LACPDUs.
        A - Device is in active mode.        P - Device is in passive mode.
Local information:
                            LACP port     Admin     Oper    Port        Port
Port      Flags   State     Priority      Key       Key     Number      State
Fa1/18    SA      bndl      2             0x2       0x2     0x113       0x3D
Partner's information:
          Partner Partner   LACP Partner  Partner   Partner  Partner     Partner
Port      Flags   State     Port Priority Admin Key Oper Key Port Number Port State
Fa1/18    SA      bndl      2             0x0       0x2      0x313       0x3D
Age of the port in the current state: 0d:03h:43m:24s
Port-channels in the group:
Port-channel: Po42    (Primary Aggregator)
Age of the Port-channel   = 0d:21h:34m:45s
Logical slot/port   = 14/42          Number of ports = 3
HotStandBy port = null
Port state          = Port-channel Ag-Inuse
Protocol            =   LACP
Fast-switchover     = disabled
Load share deferral = disabled
Standalone Disable  = enabled
Ports in the Port-channel:
Index   Load      Port          EC state       No of bits
------+------+------------+------------------+-----------
 2      49         Fa1/18             Active   3
 1      92         Fa1/19             Active   3
 3      24         Fa1/20             Active   2
Time since last port bundled:    0d:03h:43m:30s    Fa1/18
Time since last port Un-bundled: 0d:03h:40m:50s    Fa1/17
Last applied Hash Distribution Algorithm: Fixed
```

Related Commands

Command	Description
channel-group	Assigns and configures an EtherChannel interface to an EtherChannel group.
channel-protocol	Sets the protocol that is used on an interface to manage channeling.
interface port-channel	Accesses or creates the IDB port channel.

show hw-module slot tech-support through show interfaces vg-anylan

show interfaces

To display statistics for all interfaces configured on the router or access server, use the **show interfaces** command in privileged EXEC mode.

Cisco 2500 Series, Cisco 2600 Series, Cisco 4700 Series, and Cisco 7000 Series

show interfaces [*type number*] [*first*] [*last*] **[accounting]**

Catalyst 6500 Series, Cisco 7200 Series and Cisco 7500 Series with a Packet over SONET Interface Processor

show interfaces [**type slot**/**port**] [**accounting**| **counters protocol status**| **crb**| **dampening**| **description**| **dot1ad**| **etherchannel** [**module number**]| **fair-queue**| **irb**| **mac-accounting**| **mpls-exp**| **precedence**| **random-detect**| **rate-limit**| **stats**| **summary**| **switching**| **utilization** {*type number*}]

Cisco 7500 Series with Ports on VIPs

show interfaces [*type slot*/*port-adapter*/*port*]

Cisco 7600 Series

show interfaces [*type number*| **null** *interface-number*| **vlan** *vlan-id*]

Channelized T3 Shared Port Adapters

show interfaces serial [*slot*/*subslot*/*port*/*t1-num* : *channel-group*]

Shared Port Adapters

show interfaces type [*slot*/*subslot*/*port* [/*sub-int*]]

Syntax Description

type	(Optional) Interface type. Allowed values for *type* can be **atm**, **async**, **auto-template**, **bvi**, **bri0**, **ctunnel**, **container**, **dialer**, **e1**, **esconPhy**, **ethernet**, **fastethernet**, **fcpa**, **fddi**, **filter**, **filtergroup**, **gigabitethernet**, **ge-wan**, **hssi**, **longreachethernet**, **loopback**, **mfr**, **multilink**, **module**,**null**, **posport-channel**, , **port-group**, **pos-channel**, **sbc**, **sdcc**, **serial**, **sysclock**, **t1**, **tengigabitethernet**, **token**, **tokenring**, **tunnel**, **vif**, **vmi**, **virtual-access**, **virtual-ppp**, **virtual-template**, **virtual-tokenring**. **voaBypassIn**, **voaBypassOut**, **voaFilterIn**, **voaFilterOut**, **voaIn**, **voaOut**. **Note** The type of interfaces available is based on the type of router used.
number	(Optional) Port number on the selected interface.

first last	(Optional) For Cisco 2500 series routers, ISDN Basic Rate Interfae (BRI) only. The *first* argument can be either 1 or 2. The *last* argument can only be 2, indicating B channels 1 and 2. D-channel information is obtained by using the command without the optional arguments.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.
counters protocol status	(Optional) Displays the current status of the protocol counters enabled.
crb	(Optional) Displays interface routing or bridging information.
dampening	(Optional) Displays interface dampening information.
description	(Optional) Displays the interface description.
etherchannel [**module***number*]	(Optional) Displays interface Ether Channel information. • **module** --The **module** keyword limits the display to interfaces available on the module.
fair-queue	(Optional) Displays interface Weighted Fair Queueing (WFQ) information.
irb	(Optional) Displays interface routing or bridging information.
mac-accounting	(Optional) Displays interface MAC accounting information.
mpls-exp	(Optional) Displays interface Multiprotocol Label Switching (MPLS) experimental accounting information.
precedence	(Optional) Displays interface precedence accounting information.
random-detect	(Optional) Displays interface Weighted Random Early Detection (WRED) information.
rate-limit	(Optional) Displays interface rate-limit information.
stats	(Optional) Displays interface packets and octets, in and out, by using switching path.

summary	(Optional) Displays an interface summary.
switching	(Optional) Displays interface switching.
null *interface-number*	(Optional) Specifies the null interface, that is **0**.
slot	(Optional) Slot number. Refer to the appropriate hardware manual for slot information.
/ *port*	(Optional) Port number. Refer to the appropriate hardware manual for port information.
/ *port-adapter*	(Optional) Port adapter number. Refer to the appropriate hardware manual for information about port adapter compatibility.
slot **/** *subslot* **/** *port* **/** *t1-num* **:** *channel-group*	(Optional) Channelized T3 Shared Port Adapters Number of the chassis slot that contains the channelized T3 Shared Port Adapters (SPA) (for example, 5/0/0:23), where: • *slot* --(Optional) Chassis slot number. For SPA interface processors (SIPs), refer to the platform-specific SPA hardware installation guide or the corresponding "Identifying Slots and Subslots for SIPs and SPAs" topic in the platform-specific SPA software configuration guide. • **/** *subslot*-- (Optional) Secondary slot number on a SIP where a SPA is installed. Refer to the platform-specific SPA hardware installation guide and the corresponding "Specifying the Interface Address on a SPA" topic in the platform-specific SPA software configuration guide for subslot information. • **/** *port* --(Optional) Port or interface number. For SPAs, refer to the corresponding "Specifying the Interface Address on a SPA" topic in the platform-specific SPA software configuration guide. • **/** *t1-num*-- (Optional) T1 time slot in the T3 line. The value can be from 1 to 28. • **:** *channel-group*-- (Optional) Number 0-23 of the DS0 link on the T1 channel.

[*slot*/*subslot*/*port*/*sub-int*]]	(Optional) Shared Port Adapters Number of the chassis slot that contains the SPA interface (for example, 4/3/0), where: • *slot* --(Optional) Chassis slot number. For SIPs, refer to the platform-specific SPA hardware installation guide or the corresponding "Identifying Slots and Subslots for SIPs and SPAs" topic in the platform-specific SPA software configuration guide. • / *subslot*-- (Optional)Secondary slot number on a SIP where a SAP is installed. Refer to the platform-specific SPA hardware installation guide and the corresponding "Specifying the Interface Address on a SPA" topic in the platform-specific SPA software configuration guide for subslot information. • / *port* --(Optional) Port or interface number. For SPAs, refer to the corresponding "Specifying the Interface Address on a SPA" topics in the platform-specific SPA software configuration guide. • / *sub-int* -- (Optional) Subinterface number (for those SPAs that support subinterface configuration).
vlan *vlan-id*	(Optional) Specifies the VLAN ID; valid values are from 1 to 4094.

Command Modes

User EXEC (>)

Privileged EXEC (#)

Command History

Release	Modification
10.0	This command was introduced.
12.0(3)T	This command was modified to include support for flow-based WRED .
12.0(4)T	This command was modified to include enhanced display information for dialer bound interfaces.
12.0(7)T	This command was modified to include **dialer** as an interface type and to reflect the default behavior.

Release	Modification
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(20)S2	This command was integrated into Cisco IOS Release 12.2(20)S2 and introduced a new address format and output for SPA interfaces on the Cisco 7304 router. The *subslot* argument was introduced.
12.2(25)S3	This command was integrated into Cisco IOS Release 12.2(25)S3.
12.2(14)SX	This command was modified. Support for this command was added for the Supervisor Engine 720.
12.2(17d)SXB	This command was modified. Support for this command on the Supervisor Engine 2 was extended to Cisco IOS Release 12.2SX. The uplink dual-mode port information was updated.
12.2(18)SXE	This command was integrated into Cisco IOS Release 12.2(18)SXE to support SPAs on the Cisco 7600 series routers and Catalyst 6500 series switches.
2.2(33)SXJ01	This command was integrated into Cisco IOS Release 12.2(33)SXJ01.
12.0(31)S	This command was integrated into Cisco IOS Release 12.0(31)S to support SPAs on the Cisco 12000 series routers, and the **tengigabitethernet** interface type was added. 10-Gigabit Ethernet interfaces were introduced with the release of the 1-Port 10-Gigabit Ethernet SPA.
12.2(18)SXF	This command was integrated into Cisco IOS Release 12.2(18)SXF.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SRB1	This command was updated to display operational status for Gigabit Ethernet interfaces that are configured as primary and backup interfaces (Cisco 7600 series routers).
12.2(31)SB	This command was integrated in Cisco IOS Release 12.2(31)SB.
12.2(33)SB	This command was modified. The default value of the command was modified on the Cisco 10000 series router for the PRE3 and PRE4.
Cisco IOS XE Release 2.5	This command was implemented on Cisco ASR 1000 Series Aggregation Services Routers.
12.2(50)SY	This command was integrated in Cisco IOS Release 12.2(50)SY and the dot1ad keyword was added.
15.1(01)SY	This command was integrated in Cisco IOS Release 15.1(50)SY.

Usage Guidelines

Display Interpretation

The **show interfaces** command displays statistics for the network interfaces. The resulting output varies, depending on the network for which an interface has been configured. The resulting display on the Cisco 7200 series routers shows the interface processors in slot order. If you add interface processors after booting the system, they will appear at the end of the list, in the order in which they were inserted.

Information About Specific Interfaces

The *number* argument designates the module and port number. If you use the **show interfaces** command on the Cisco 7200 series routers without the *slot*/*port* arguments, information for all interface types will be shown. For example, if you type **show interfaces** you will receive information for all Ethernet, serial, Token Ring, and FDDI interfaces. Only by adding the type *slot*/*port* argument you can specify a particular interface.

Cisco 7600 Series Routers

Valid values for the *number* argument depend on the specified interface type and the chassis and module that are used. For example, if you specify a Gigabit Ethernet interface and have a 48-port 10/100BASE-T Ethernet module that is installed in a 13-slot chassis, valid values for the module number are from 1 to 13 and valid values for the port number are from 1 to 48.

The port channels from 257 to 282 are internally allocated and are supported on the Content Switching Module (CSM) and the Firewall Services Module (FWSM) only.

Statistics are collected on a per-VLAN basis for Layer 2-switched packets and Layer 3-switched packets. Statistics are available for both unicast and multicast traffic. The Layer 3-switched packet counts are available for both ingress and egress directions. The per-VLAN statistics are updated every 5 seconds.

In some cases, you might see a difference in the duplex mode that is displayed between the **show interfaces** command and the **show running-config**commands. In this case, the duplex mode that is displayed in the **show interfaces** command is the actual duplex mode that the interface is running. The **show interfaces** command shows the operating mode for an interface, and the **show running-config** command shows the configured mode for an interface.

If you do not enter any keywords, all counters for all modules are displayed.

Command Variations

You will use the **show interfaces** command frequently while configuring and monitoring devices. The various forms of the **show interfaces** commands are described in detail in the sections that follow.

Dialer Interfaces Configured for Binding

If you use the **show interfaces** command on dialer interfaces configured for binding, the display will report statistics on each physical interface bound to the dialer interface; see the following examples for more information.

Removed Interfaces

If you enter a **show interfaces** command for an interface type that has been removed from the router or access server, interface statistics will be displayed accompanied by the following text: “Hardware has been removed.”

Weighted Fair Queueing Information

If you use the **show interfaces** command on a router or access server for which interfaces are configured to use weighted fair queueing through the **fair-queue** interface command, additional information is displayed. This information consists of the current and high-water mark number of flows.

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In Cisco IOS Release 12.2(33)SB, when a multilink PPP (MLP) interface is down/down, its default bandwidth rate is the sum of the serial interface bandwidths associated with the MLP interface.

In Cisco IOS Release 12.2(31)SB, the default bandwidth rate is 64 Kbps.

Examples The following is sample output from the **show interfaces** command. Because your display will depend on the type and number of interface cards in your router or access server, only a portion of the display is shown.

Note If an asterisk (*) appears after the throttles counter value, it means that the interface was throttled at the time the command was run.

```
Router# show interfaces
Ethernet 0 is up, line protocol is up
  Hardware is MCI Ethernet, address is 0000.0c00.750c (bia 0000.0c00.750c)
  Internet address is 10.108.28.8, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 10000 Kbit, DLY 100000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 0:00:00, output 0:00:00, output hang never
  Last clearing of "show interface" counters 0:00:00
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 2000 bits/sec, 4 packets/sec
     1127576 packets input, 447251251 bytes, 0 no buffer
     Received 354125 broadcasts, 0 runts, 0 giants, 57186* throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     5332142 packets output, 496316039 bytes, 0 underruns
     0 output errors, 432 collisions, 0 interface resets, 0 restarts
.
.
.
```

Examples The following example shows partial sample output when custom output queueing is enabled:

```
Router# show interfaces
Last clearing of "show interface" counters 0:00:06
Input queue: 0/75/0 (size/max/drops); Total output drops: 21
Output queues: (queue #: size/max/drops)
     0: 14/20/14  1: 0/20/6  2: 0/20/0 3: 0/20/0 4: 0/20/0 5: 0/20/0
     6: 0/20/0 7: 0/20/0  8: 0/20/0  9: 0/20/0  10: 0/20/0
.
.
.
```

When custom queueing is enabled, the drops accounted for in the output queues result from bandwidth limitation for the associated traffic and lead to queue length overflow. Total output drops include drops on all custom queues and the system queue. Fields are described with the weighted fair queueing output in the table below.

Examples For each interface on the router or access server configured to use weighted fair queueing, the **show interfaces** command displays the information beginning with *Inputqueue***:** in the following display:

```
Router# show interfaces
Ethernet 0 is up, line protocol is up
  Hardware is MCI Ethernet, address is 0000.0c00.750c (bia 0000.0c00.750c)
  Internet address is 10.108.28.8, subnet mask is 255.255.255.0
  MTU 1500 bytes, BW 10000 Kbit, DLY 100000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 0:00:00, output 0:00:00, output hang never
  Last clearing of "show interface" counters 0:00:00
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
```

```
  Five minute output rate 2000 bits/sec, 4 packets/sec
     1127576 packets input, 447251251 bytes, 0 no buffer
     Received 354125 broadcasts, 0 runts, 0 giants, 57186* throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     5332142 packets output, 496316039 bytes, 0 underruns
     0 output errors, 432 collisions, 0 interface resets, 0 restarts
Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Output queue: 7/64/0 (size/threshold/drops)
        Conversations 2/9 (active/max active)
```

The table below describes the input queue and output queue fields shown in the preceding two displays.

Table 6: Weighted-Fair-Queueing Output Field Descriptions

Field	Description
Input Queue	
size	Current size of the input queue.
max	Maximum size of the queue.
drops	Number of messages discarded in this interval.
Total output drops	Total number of messages discarded in this session.
Output Queue	
size	Current size of the output queue.
threshold	Congestive-discard threshold. Number of messages in the queue after which new messages for high-bandwidth conversations are dropped.
drops	Number of dropped messages.
Conversations: active	Number of currently active conversations.
Conversations: max active	Maximum number of concurrent conversations allowed.

Examples

To display the number of packets of each protocol type that have been sent through all configured interfaces, use the **show interfaces accounting** command. When you use the **accounting** option, only the accounting statistics are displayed.

Note Except for protocols that are encapsulated inside other protocols, such as IP over X.25, the accounting option also shows the total bytes sent and received, including the MAC header. For example, it totals the size of the Ethernet packet or the size of a packet that includes High-Level Data Link Control (HDLC) encapsulation.

Per-packet accounting information is kept for the following protocols:

- AppleTalk
- Address Resolution Protocol (ARP) (for IP, Frame Relay, Switched Multimegabit Data Service (SMDS))
- Connectionless Network Service (CLNS)
- Digital Equipment Corporation (DEC) Maintenance Operations Protocol (MOP)

The routers use MOP packets to advertise their existence to Digital Equipment Corporation machines that use the MOP. A router periodically broadcasts MOP packets to identify itself as a MOP host. This results in MOP packets being counted, even when DECnet is not being actively used.

- DECnet
- HP Probe
- IP
- LAN Manager (LAN Network Manager and IBM Network Manager)
- Novell
- Serial Tunnel Synchronous Data Link Control (SDLC)
- Spanning Tree
- SR Bridge
- Transparent Bridge

Examples

The following is sample output from the **show interfaces** command when distributed WRED (DWRED) is enabled on an interface. Notice that the packet drop strategy is listed as "VIP-based weighted RED."

```
Router# show interfaces hssi 0/0/0
Hssi0/0/0 is up, line protocol is up
  Hardware is cyBus HSSI
  Description: 45Mbps to R1
Internet address is 10.200.14.250/30
MTU 4470 bytes, BW 45045 Kbit, DLY 200 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive set (10 sec)
Last input 00:00:02, output 00:00:03, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Packet Drop strategy: VIP-based weighted RED
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
1976 packets input, 131263 bytes, 0 no buffer
Received 1577 broadcasts, 0 runts, 0 giants
0 parity
4 input errors, 4 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
1939 packets output, 130910 bytes, 0 underruns
0 output errors, 0 applique, 3 interface resets
0 output buffers copied, 0 interrupts, 0 failures
```

Examples

The following is sample output from the **show interfaces** command for serial interface 2 when Airline Control (ALC) Protocol is enabled:

```
Router# show interfaces serial 2
Serial2 is up, line protocol is up
Hardware is CD2430
MTU 1500 bytes, BW 115 Kbit, DLY 20000 usec, rely 255/255, load 1/255
```

```
Encapsulation ALC, loopback not set
Full-duplex enabled.
     ascus in UP state: 42, 46
     ascus in DOWN state:
     ascus DISABLED:
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
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 no buffer
Received 0 broadcasts, 0 runts, 0 giants
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 3 interface resets
0 output buffer failures, 0 output buffers swapped out
DCD=down  DSR=down  DTR=down  RTS=down  CTS=down
```

Examples

The following is sample output from the **show interfaces** command for an SDLC primary interface supporting the SDLC function:

```
Router# show interfaces
Serial 0 is up, line protocol is up
 Hardware is MCI Serial
 MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
 Encapsulation SDLC-PRIMARY, loopback not set
      Timers (msec): poll pause 100 fair poll 500. Poll limit 1
      [T1 3000, N1 12016, N2 20, K 7] timer: 56608 Last polled device: none
      SDLLC [ma: 0000.0C01.14--, ring: 7 bridge: 1, target ring: 10
             largest token ring frame 2052]
SDLC addr C1 state is CONNECT
       VS 6, VR 3, RCNT 0, Remote VR 6, Current retransmit count 0
       Hold queue: 0/12 IFRAMEs 77/22 RNRs 0/0 SNRMs 1/0 DISCs 0/0
       Poll: clear, Poll count: 0, chain: p: C1 n: C1
       SDLLC [largest SDLC frame: 265, XID: disabled]
  Last input 00:00:02, output 00:00:01, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 517 bits/sec, 30 packets/sec
  Five minute output rate 672 bits/sec, 20 packets/sec
       357 packets input, 28382 bytes, 0 no buffer
       Received 0 broadcasts, 0 runts, 0 giants
       0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
       926 packets output, 77274 bytes, 0 underruns
       0 output errors, 0 collisions, 0 interface resets, 0 restarts
       2 carrier transitions
```

The table below shows the fields relevant to all SDLC connections.

Table 7: show interfaces Field Descriptions When SDLC Is Enabled

Field	Description
Timers (msec)	List of timers in milliseconds.
poll pause, fair poll, Poll limit	Current values of these timers.
T1, N1, N2, K	Current values for these variables.

The table below shows other data given for each SDLC secondary interface configured to be attached to this interface.

Table 8: SDLC Field Descriptions

Field	Description
addr	Address of this secondary interface.
State	Current state of this connection. The possible values follow: • BOTHBUSY--Both sides have told each other that they are temporarily unable to receive any more information frames. • CONNECT--A normal connect state exists between this router and this secondary. • DISCONNECT--No communication is being attempted to this secondary. • DISCSENT--This router has sent a disconnect request to this secondary and is awaiting its response. • ERROR--This router has detected an error, and is waiting for a response from the secondary acknowledging this. • SNRMSENT--This router has sent a connect request (SNRM) to this secondary and is awaiting its response. • THEMBUSY--This secondary has told this router that it is temporarily unable to receive any more information frames. • USBUSY--This router has told this secondary that it is temporarily unable to receive any more information frames.
VS	Sequence number of the next information frame this station sends.
VR	Sequence number of the next information frame from this secondary that this station expects to receive.
RCNT	Number of correctly sequenced I-frames received when the Cisco IOS software was in a state in which it is acceptable to receive I-frames.
Remote VR	Last frame transmitted by this station that has been acknowledged by the other station.
Current retransmit count	Number of times the current I-frame or sequence of I-frames has been retransmitted.

Field	Description
Hold queue	Number of frames in hold queue/Maximum size of hold queue.
IFRAMEs, RNRs, SNRMs, DISCs	Sent and received count for these frames.
Poll	"Set" if this router has a poll outstanding to the secondary; "clear" if it does not.
Poll count	Number of polls, in a row, given to this secondary at this time.
chain	Shows the previous (p) and next (n) secondary address on this interface in the round-robin loop of polled devices.

Examples

The following is sample output from the **show interfaces accounting** command:

```
Router# show interfaces accounting
Interface TokenRing0 is disabled
Ethernet0
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
                      IP     873171  735923409      34624    9644258
                  Novell     163849   12361626      57143    4272468
                 DEC MOP          0          0          1         77
                     ARP      69618    4177080       1529      91740
Interface Serial0 is disabled
Ethernet1
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
                      IP          0          0         37      11845
                  Novell          0          0       4591     275460
                 DEC MOP          0          0          1         77
                     ARP          0          0          7        420
Interface Serial1 is disabled
Interface Ethernet2 is disabled
Interface Serial2 is disabled
Interface Ethernet3 is disabled
Interface Serial3 is disabled
Interface Ethernet4 is disabled
Interface Ethernet5 is disabled
Interface Ethernet6 is disabled
Interface Ethernet7 is disabled
Interface Ethernet8 is disabled
Interface Ethernet9 is disabled
Fddi0
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
                  Novell          0          0        183      11163
                     ARP          1         49          0          0
```

When the output indicates that an interface is " disabled," the router has received excessive errors (over 5000 in a keepalive period).

Examples

The following is sample output from the **show interfaces** command issued for the serial interface 1 for which flow-based WRED is enabled. The output shows that there are 8 active flow-based WRED flows, that the

maximum number of flows active at any time is 9, and that the maximum number of possible flows configured for the interface is 16:

```
Router# show interfaces serial 1
Serial1 is up, line protocol is up
  Hardware is HD64570
  Internet address is 10.1.2.1/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
Reliability 255/255, txload 237/255, rxload 1/255
  Encapsulation HDLC, loopback not set
  Keepalive not set
  Last input 00:00:22, output 00:00:00, output hang never
  Last clearing of "show interface" counters 00:17:58
  Input queue: 0/75/0 (size/max/drops); Total output drops: 2479
Queueing strategy: random early detection(RED)
    flows (active/max active/max): 8/9/16
    mean queue depth: 27
    drops: class  random   tail     min-th   max-th   mark-prob
           0      946      0        20       40       1/10
           1      488      0        22       40       1/10
           2      429      0        24       40       1/10
           3      341      0        26       40       1/10
           4      235      0        28       40       1/10
           5      40       0        31       40       1/10
           6      0        0        33       40       1/10
           7      0        0        35       40       1/10
           rsvp   0        0        37       40       1/10
  30 second input rate 1000 bits/sec, 2 packets/sec
  30 second output rate 119000 bits/sec, 126 packets/sec
     1346 packets input, 83808 bytes, 0 no buffer
     Received 12 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     84543 packets output, 9977642 bytes, 0 underruns
     0 output errors, 0 collisions, 6 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
```

Examples

The following is sample output from the **show interfaces** command when distributed weighted fair queueing (DWFQ) is enabled on an interface. Notice that the queueing strategy is listed as "VIP-based fair queueing."

```
Router# show interfaces fastethernet 1/1/0
Fast Ethernet 1/1/0 is up, line protocol is up
  Hardware is cyBus Fast Ethernet Interface, address is 0007.f618.4448 (bia 00e0)
  Description: pkt input i/f for WRL tests (to pagent)
  Internet address is 10.0.2.70/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive not set, fdx, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 01:11:01, output hang never
  Last clearing of "show interface" counters 01:12:31
  Queueing strategy: VIP-based fair queueing
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  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 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast
     0 input packets with dribble condition detected
     1 packets output, 60 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffers copied, 0 interrupts, 0 failures
```

Examples

When the **show interfaces** command is issued on an unbound dialer interface, the output looks as follows:

```
Router# show interfaces dialer 0
Dialer0 is up (spoofing), line protocol is up (spoofing)
  Hardware is Unknown
  Internet address is 10.1.1.2/8
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 3/255
  Encapsulation PPP, loopback not set
  DTR is pulsed for 1 seconds on reset
  Last input 00:00:34, output never, output hang never
  Last clearing of "show interface" counters 00:05:09
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 1000 bits/sec, 0 packets/sec
     18 packets input, 2579 bytes
     14 packets output, 5328 bytes
```

But when the **show interfaces** command is issued on a bound dialer interface, you will get an additional report that indicates the binding relationship. The output is shown here:

```
Router# show interfaces dialer 0
Dialer0 is up, line protocol is up
  Hardware is Unknown
  Internet address is 10.1.1.2/8
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set
  DTR is pulsed for 1 seconds on reset
  Interface is bound to BRI0:1
  Last input 00:00:38, output never, output hang never
  Last clearing of "show interface" counters 00:05:36
Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     38 packets input, 4659 bytes
     34 packets output, 9952 bytes
Bound to:
BRI0:1 is up, line protocol is up
  Hardware is BRI
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set
  Interface is bound to Dialer0 (Encapsulation PPP)
  LCP Open, multilink Open
  Last input 00:00:39, output 00:00:11, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     78 packets input, 9317 bytes, 0 no buffer
     Received 65 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     93 packets output, 9864 bytes, 0 underruns
     0 output errors, 0 collisions, 7 interface resets
     0 output buffer failures, 0 output buffers swapped out
     4 carrier transitions
```

At the end of the Dialer0 output, the **show interfaces** command is executed on each physical interface bound to it.

The following is sample output from the **show interfaces dialer stats** command:

```
Router# show interfaces dialer 0 stats
Dialer0
  Switching path    Pkts In   Chars In   Pkts Out  Chars Out
       Processor          0          0          6       1694
```

```
      Route cache  2522229  610372530     720458  174343542
            Total  2522229  610372530     720464  174345236
```

Examples

In this example, the physical interface is the B1 channel of the BRI0 link. This example also illustrates that the output under the B channel keeps all hardware counts that are not displayed under any logical or virtual access interface. The line in the report that states "Interface is bound to Dialer0 (Encapsulation LAPB)" indicates that the B interface is bound to Dialer0 and the encapsulation running over this connection is Link Access Procedure, Balanced (LAPB), not PPP, which is the encapsulation configured on the D interface and inherited by the B channel.

```
Router# show interfaces bri0:1
BRI0:1 is up, line protocol is up
  Hardware is BRI
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set

Interface is bound to Dialer0 (Encapsulation LAPB)
  LCP Open, multilink Open
  Last input 00:00:31, output 00:00:03, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 1 packets/sec
  5 minute output rate 0 bits/sec, 1 packets/sec
     110 packets input, 13994 bytes, 0 no buffer
     Received 91 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     135 packets output, 14175 bytes, 0 underruns
     0 output errors, 0 collisions, 12 interface resets
     0 output buffer failures, 0 output buffers swapped out
     8 carrier transitions
```

Any protocol configuration and states should be displayed from the Dialer0 interface.

Examples

The following is sample output from the **show interfaces fastethernet** command for the second interface (port 1) in a 4-Port 10/100 Fast Ethernet SPA located in the bottom subslot (1) of the Modular Service Cards (MSC) that is installed in slot 2 on a Cisco 7304 router:

```
Router# show interfaces fastethernet 2/1/1
FastEthernet2/1/1 is up, line protocol is up
  Hardware is SPA-4FE-7304, address is 00b0.64ff.5d80 (bia 00b0.64ff.5d80)
  Internet address is 192.168.50.1/24
  MTU 9216 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, 100BaseTX/FX
ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:22, output 00:00:02, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     5 packets input, 320 bytes
     Received 1 broadcasts (0 IP multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog
     0 input packets with dribble condition detected
     8 packets output, 529 bytes, 0 underruns
     0 output errors, 0 collisions, 2 interface resets
     0 babbles, 0 late collision, 0 deferred
```

```
     2 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
```

Examples

```
Router# show interfaces e4/0
Ethernet4/0 is up, line protocol is up
  Hardware is AmdP2, address is 000b.bf30.f470 (bia 000b.bf30.f470)
  Internet address is 10.1.1.9/24
  MTU 1500 bytes, BW 10000 Kbit, RxBW 5000 Kbit, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 254/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:00, output 00:00:01, output hang never
  Last clearing of "show interface" counters 00:03:36
  Input queue: 34/75/0/819 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  30 second input rate 7138000 bits/sec, 14870 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
     3109298 packets input, 186557880 bytes, 0 no buffer
     Received 217 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 input packets with dribble condition detected
     22 packets output, 1320 bytes, 0 underruns
     11 output errors, 26 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
```

The table below describes the significant fields shown in the display.

Table 9: show interfaces fastethernet Field Descriptions--Fast Ethernet SPA

Field	Description
Fast Ethernet...is up ...is administratively down	Indicates whether the interface hardware is currently active and if it has been taken down by an administrator.
line protocol is	Indicates whether the software processes that handle the line protocol consider the line usable or if it has been taken down by an administrator.
Hardware	Hardware type (for example, SPA-4FE-7304) and MAC address.
Description	Alphanumeric string identifying the interface. This appears only if the **description** interface configuration command has been configured on the interface.
Internet address	Internet address followed by subnet mask.
MTU	Maximum transmission unit of the interface. The default is 1500 bytes for the 4-Port 10/100 Fast Ethernet SPA.
BW	Bandwidth of the interface in kilobits per second.

Field	Description
RxBW	Receiver bandwidth of the interface, in kilobits per second. This value is displayed only when an interface has asymmetric receiver and transmitter rates.
DLY	Delay of the interface in microseconds.
reliability	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
txload, rxload	Load on the interface (in the transmit "tx" and receive "rx" directions) as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
Encapsulation	Encapsulation method assigned to the interface.
loopback	Indicates whether loopback is set.
Keepalive	Indicates whether keepalives are set, and the time interval.
Half-duplex, Full-duplex	Indicates the duplex mode for the interface.
100Mb/s, 10Mb/s	Speed of the interface in megabits per second.
100BaseTX/FX	Media protocol standard.
ARP type:	Type of ARP assigned and the timeout period.
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. This field is not updated by fast-switched traffic.
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.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is displayed. If that field overflows, asterisks are printed. **Note** This field does not apply to SPA interfaces.

Field	Description
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. A series of asterisks (***) indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 231 ms (and less than 232 ms) ago.
Input queue (size/max/drops/flushes)	Packet statistics on the input queue reported as: • Size--Number of packets in the input queue. • Max--Maximum size of the queue. • Drops--Number of packets dropped because of a full input queue. • Flushes--Number of packets dropped as part of selective packet discard (SPD). SPD implements a selective packet drop policy on the router's IP process queue. Therefore, it applies only to process-switched traffic.
Total output drops	Total number of packets dropped because of a full output queue.
Queueing strategy	Type of Layer 3 queueing active on this interface. The default is first-in, first-out (FIFO).
Output queue (size/max)	Number of packets in the output queue (size), and the maximum size of the queue (max).
5 minute input rate, 5 minute output rate	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 it sends and receives (rather than all network traffic). 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 will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.

Field	Description
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.
runts	Number of packets that are discarded because they are smaller than the minimum packet size of the medium. For instance, any Ethernet packet that is smaller than 64 bytes is considered a runt.
giants	Number of packets that are discarded because they exceed the maximum packet size of the medium. For example, any Ethernet packet that is larger than 1536 bytes is considered a giant. **Note** For the 4-Port 10/100 Fast Ethernet SPA, the default is that a giant is any packet greater than 1536 bytes. However, if you modify the maximum transmission unit (MTU) for the interface, this counter increments when you exceed the specified MTU for the interface.
throttles	Number of times the receiver on the port was disabled, possibly because of buffer or processor overload.
input errors	Includes runts, giants, no buffer, cyclic redundancy check (CRC), frame, overrun, and ignored counts. Other input-related errors can also cause the input errors count to be increased, and some datagrams may have more than one error; therefore, this sum may not balance with the sum of enumerated input error counts.
CRC	Cyclic redundancy check generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data.

Field	Description
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a LAN, this is usually the result of collisions or a malfunctioning Ethernet device.
overrun	Number of times the 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. These buffers are different than the system buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.
watchdog	Number of times the watchdog receive timer expired. Expiration happens when receiving a packet with a length greater than 2048 bytes.
input packets with dribble condition detected	Dribble bit error indicates that a frame is slightly too long. This frame error counter is incremented for informational purposes only; the router accepts the frame.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, because some datagrams may have more than one error and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	Number of messages retransmitted because of an Ethernet collision. This is usually the result of an overextended LAN (Ethernet or transceiver cable too long, more than two repeaters between stations, or too many cascaded multiport transceivers). A packet that collides is counted only once in output packets.

Field	Description
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. Interface resets can occur when an interface is looped back or shut down.
babbles	Transmit jabber timer expired.
late collision	Number of late collisions. Late collision happens when a collision occurs after transmitting the preamble.
deferred	Number of times that the interface had to defer while ready to transmit a frame because the carrier was asserted.
lost carrier	Number of times the carrier was lost during transmission.
no carrier	Number of times the carrier was not present during the transmission. **Note** This field does not apply to SPA interfaces.
output buffer failures, output buffers swapped out	These counters are not used by the 4-Port 10/100 Fast Ethernet SPA on the Cisco 7304 router.

Examples

The following is sample output from the **show interfaces gigabitethernet** command for the first interface (port 0) in a 2-Port 10/100/1000 Gigabit Ethernet SPA located in the top subslot (0) of the MSC that is installed in slot 4 on a Cisco 7304 router:

```
Router# show interfaces gigabitethernet 4/0/0

GigabitEthernet4/0/0 is up, line protocol is down
  Hardware is SPA-2GE-7304, address is 00b0.64ff.5a80 (bia 00b0.64ff.5a80)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Half-duplex, 1000Mb/s, link type is auto, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:09, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  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 no buffer
     Received 0 broadcasts (0 IP multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
```

```
     0 watchdog, 0 multicast, 0 pause input
     109 packets output, 6540 bytes, 0 underruns
     0 output errors, 0 collisions, 2 interface resets
     0 babbles, 0 late collision, 0 deferred
     1 lost carrier, 0 no carrier, 0 PAUSE output
     0 output buffer failures, 0 output buffers swapped out
```

Examples

The following examples show the additional lines included in the display when the command is issued on two Gigabit Ethernet interfaces that are configured as a primary interface (gi3/0/0) and as a backup interface (gi3/0/11) for the primary:

```
Router# show interfaces gigabitEthernet 3/0/0

GigabitEthernet3/0/0 is up, line protocol is up (connected)
  Hardware is GigEther SPA, address is 0005.dc57.8800 (bia 0005.dc57.8800)
  Backup interface GigabitEthernet3/0/11, failure delay 0 sec, secondary disable delay 0
sec,
  .
  .
  .
Router# show interfaces gigabitEthernet 3/0/11

GigabitEthernet3/0/11 is standby mode, line protocol is down (disabled)
  .
  .
  .
```

The table below describes the fields shown in the display for Gigabit Ethernet SPA interfaces.

Table 10: show interfaces gigabitethernet Field Descriptions--Gigabit Ethernet SPA

Field	Description
GigabitEthernet...is up ...is administratively down	Indicates whether the interface hardware is currently active and if it has been taken down by an administrator.
line protocol is	Indicates whether the software processes that handle the line protocol consider the line usable or if it has been taken down by an administrator.
Hardware	Hardware type (for example, SPA-2GE-7304) and MAC address.
Backup interface	Identifies the backup interface that exists for this, the primary interface.
Failure and secondary delay	The period of time (in seconds) to delay bringing up the backup interface when the primary goes down, and bringing down the backup after the primary becomes active again. On the Cisco 7600 router, the delay must be 0 (the default) to ensure that there is no delay between when the primary goes down and the backup comes up, and vice versa.
Standby mode	Indicates that this is a backup interface and that it is currently operating in standby mode.

Field	Description
Description	Alphanumeric string identifying the interface. This appears only if the **description** interface configuration command has been configured on the interface.
Internet address	Internet address followed by subnet mask.
MTU	Maximum transmission unit of the interface. The default is 1500 bytes for the 2-Port 10/100/1000 Gigabit Ethernet SPA.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
reliability	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
txload, rxload	Load on the interface (in the transmit "tx" and receive "rx" directions) as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
Encapsulation	Encapsulation method assigned to the interface.
loopback	Indicates whether loopback is set.
Keepalive	Indicates whether keepalives are set, and the time interval.
Half-duplex, Full-duplex	Indicates the duplex mode for the interface.
1000Mb/s, 100Mb/s, 10Mb/s	Speed of the interface in megabits per second.
link type	Specifies whether autonegotiation is being used on the link.
media type	Interface port media type: RJ45, SX, LX, or ZX.
100BaseTX/FX	Media protocol standard.
ARP type:	Type of ARP assigned and the timeout period.
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. This field is not updated by fast-switched traffic.

Field	Description
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.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is displayed. If that field overflows, asterisks are printed. **Note** This field does not apply to SPA interfaces.
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. A series of asterisks (***) indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 231 ms (and less than 232 ms) ago.
Input queue (size/max/drops/flushes)	Packet statistics on the input queue reported as: • Size--Number of packets in the input queue. • Max--Maximum size of the queue. • Drops--Number of packets dropped because of a full input queue. • Flushes--Number of packets dropped as part of SPD. SPD implements a selective packet drop policy on the router's IP process queue. Therefore, it applies only to process-switched traffic.
Total output drops	Total number of packets dropped because of a full output queue.
Queueing strategy	Type of Layer 3 queueing active on this interface. The default is FIFO.
Output queue (size/max)	Number of packets in the output queue (size), and the maximum size of the queue (max).

Field	Description
5 minute input rate, 5 minute output rate	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 it sends and receives (rather than all network traffic). 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 will be 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.
runts	Number of packets that are discarded because they are smaller than the minimum packet size of the medium. For instance, any Ethernet packet that is smaller than 64 bytes is considered a runt.
giants	Number of packets that are discarded because they exceed the maximum packet size of the medium. For example, any Ethernet packet that is larger than 1536 bytes is considered a giant. **Note** For the 2-Port 10/100/1000 Gigabit Ethernet SPA, the default is that a giant is any packet greater than 1536 bytes. However, if you modify the MTU for the interface, this counter increments when you exceed the specified MTU for the interface.
throttles	Number of times the receiver on the port was disabled, possibly because of buffer or processor overload.

Field	Description
input errors	Includes runts, giants, no buffer, CRC, frame, overrun, and ignored counts. Other input-related errors can also cause the input errors count to be increased, and some datagrams may have more than one error; therefore, this sum may not balance with the sum of enumerated input error counts.
CRC	Cyclic redundancy check generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a LAN, this is usually the result of collisions or a malfunctioning Ethernet device.
overrun	Number of times the 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. These buffers are different than the system buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.
watchdog	Number of times the watchdog receive timer expired. Expiration happens when receiving a packet with a length greater than 2048 bytes.
input packets with dribble condition detected	Dribble bit error indicates that a frame is slightly too long. This frame error counter is incremented for informational purposes only; the router accepts the frame.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle.

Field	Description
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, because some datagrams may have more than one error and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	Number of messages retransmitted because of an Ethernet collision. This is usually the result of an overextended LAN (Ethernet or transceiver cable too long, more than two repeaters between stations, or too many cascaded multiport transceivers). A packet that collides is counted only once in output packets.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. Interface resets can occur when an interface is looped back or shut down.
babbles	Transmit jabber timer expired.
late collision	Number of late collisions. Late collision happens when a collision occurs after transmitting the preamble.
deferred	Number of times that the interface had to defer while ready to transmit a frame because the carrier was asserted.
lost carrier	Number of times the carrier was lost during transmission.
no carrier	Number of times the carrier was not present during the transmission. **Note** This field does not apply to SPA interfaces.
output buffer failures, output buffers swapped out	These counters are not used by the 2-Port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 router.

Examples

The following is sample output from the **show interfaces pos** command on a Cisco 7600 series router or Catalyst 6500 series switch for POS interface 4/3/0 (which is the interface for port 0 of the SPA in subslot 3 of the SIP in chassis slot 4):

```
Router# show interfaces pos 4/3/0
```

```
POS4/3/0 is up, line protocol is up  (APS working - active)
  Hardware is Packet over SONET
  Internet address is 10.0.0.1/8
  MTU 4470 bytes, BW 622000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive not set
  Scramble disabled
  Last input 00:00:34, output 04:09:06, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy:fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
        Available Bandwidth 622000 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     782 packets input, 226563 bytes, 0 no buffer
     Received 0 broadcasts, 1 runts, 0 giants, 0 throttles
              0 parity
     1 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     271 packets output, 28140 bytes, 0 underruns
     0 output errors, 0 applique, 2 interface resets
     0 output buffer failures, 0 output buffers swapped out
     2 carrier transitions
```

The table below describes the significant fields shown in this display.

Table 11: show interfaces pos Field Descriptions--POS SPA

Field	Description
POS4/3/0 is up, line protocol is up	Indicates whether the interface hardware is currently active and can transmit and receive or whether it has been taken down by an administrator.
Hardware is. . .	Hardware type: • For POSIP--cyBus Packet over SONET • For POS SPAs--Packet over SONET
Internet address is	Internet address and subnet mask.
MTU	Maximum transmission unit of the interface.
BW	Bandwidth of the interface, in kilobits per second.
DLY	Delay of the interface, in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the **bandwidth** interface configuration command.

Field	Description
Encapsulation	Encapsulation method assigned to the interface.
Loopback	Indicates whether loopbacks are set.
Keepalive	Indicates whether keepalives are set.
Scramble	Indicates whether SONET payload scrambling is enabled. SONET scrambling is disabled by default. For the POS SPAs on the Cisco 12000 series routers, scrambling is enabled by default.
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. This counter is updated only when packets are process-switched, not when packets are fast-switched.
(Last) output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface. This counter is updated only when packets are process-switched, not when packets are fast-switched.
(Last) output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
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. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2231 ms (and less than 232 ms) ago.
Queueing strategy	FIFO queueing strategy (other queueing strategies you might see are priority-list, custom-list, and weighted fair).

Field	Description
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped because a queue was full.
5 minute input rate 5 minute output rate	Average number of bits and packets received or transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes (input)	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with number of packets ignored. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.
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.
throttles	Not supported for POS interfaces.
parity	Report of the parity errors on the interface.
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 LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.

Field	Description
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. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of one bits on the interface.
packets output	Total number of messages transmitted by the system.
bytes (output)	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver can handle.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this might not balance with the sum of the enumerated output errors, because some datagrams can have more than one error, and others can have errors that do not fall into any of the specifically tabulated categories.
applique	Indicates an unrecoverable error has occurred on the POSIP applique. The system then invokes an interface reset.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within a certain interval. If the system notices that the carrier detect line of an interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an unrecoverable interface processor error occurred, or when an interface is looped back or shut down.

Field	Description
output buffer failures	Not supported for POS interfaces.
output buffers swapped out	Not supported for POS interfaces.
carrier transitions	Number of times the carrier detect signal of the interface has changed state.

Examples

The following is sample output from the **show interfaces pos** command on a Cisco 12000 series router for POS interface 1/1/0 (which is the interface for port 0 of the SPA in subslot 1 of the SIP in chassis slot 1):

```
Router# show interfaces pos 1/1/0

POS1/1/0 is up, line protocol is up
  Hardware is Packet over SONET
  Internet address is 10.41.41.2/24
  MTU 4470 bytes, BW 9952000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation HDLC, crc 32, loopback not set
  Keepalive not set
  Scramble enabled
  Last input 00:00:59, output 00:00:11, output hang never
  Last clearing of "show interface" counters 00:00:14
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
        Available Bandwidth 9582482 kilobits/sec
  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 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
              0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     1 packets output, 314 bytes, 0 underruns
     0 output errors, 0 applique, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

Examples

The following is sample output from the **show interfaces sdcc**command on a Cisco 12000 series router for POS interface 1/1/0 (which is the interface for port 0 of the SPA in subslot 1 of the SIP in chassis slot 1):

```
Router# show interfaces sdcc 1/1/0

SDCC1/1/0 is administratively down, line protocol is down
  Hardware is SDCC
  MTU 1500 bytes, BW 192 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, crc 32, loopback not set
  Keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters 00:01:55
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  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 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

The table below describes the significant fields shown in the display.

Table 12: show interfaces sdcc Field Descriptions--POS SPA

Field	Description
SDCC1/1/0 is administratively down, line protocol is down	Indicates whether the interface hardware is currently active and can transmit and receive or whether it has been taken down by an administrator.
Hardware is. . .	Hardware type is SDCC--Section Data Communications Channel.
Internet address is	Internet address and subnet mask.
MTU	Maximum transmission unit of the interface.
BW	Bandwidth of the interface, in kilobits per second.
DLY	Delay of the interface, in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the **bandwidth** interface configuration command.
Encapsulation	Encapsulation method assigned to the interface.
crc	Cyclic redundancy check size (16 or 32 bits).
Loopback	Indicates whether loopback is set.
Keepalive	Indicates whether keepalives are set.
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. This counter is updated only when packets are process-switched, not when packets are fast-switched.
(Last) output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface. This counter is updated only when packets are process-switched, not when packets are fast-switched.

Field	Description
(Last) output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
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. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2231 ms (and less than 232 ms) ago.
Queueing strategy	FIFO queueing strategy (other queueing strategies you might see are priority-list, custom-list, and weighted fair).
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped because a queue was full.
5 minute input rate 5 minute output rate	Average number of bits and packets received or transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes (input)	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with number of packets ignored. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
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.
throttles	Not supported for POS interfaces.
parity	Report of the parity errors on the interface.
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 LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. 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. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of one bits on the interface.
packets output	Total number of messages transmitted by the system.
bytes (output)	Total number of bytes, including data and MAC encapsulation, transmitted by the system.

Field	Description
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver can handle.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this might not balance with the sum of the enumerated output errors, because some datagrams can have more than one error, and others can have errors that do not fall into any of the specifically tabulated categories.
collisions	Not supported for POS interfaces.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within a certain interval. If the system notices that the carrier detect line of an interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an unrecoverable interface processor error occurred, or when an interface is looped back or shut down.
output buffer failures	Not supported for POS interfaces.
output buffers swapped out	Not supported for POS interfaces.
carrier transitions	Number of times the carrier detect signal of the interface has changed state.

Examples

The following example shows the interface serial statistics on the first port of a T3/E3 SPA installed in subslot 0 of the SIP located in chassis slot 5:

```
Router# show interfaces serial 5/0/0
Serial5/0/0 is up, line protocol is up
  Hardware is SPA-4T3E3
  Internet address is 10.1.1.2/24
  MTU 4470 bytes, BW 44210 Kbit, DLY 200 usec,
     reliability 255/255, txload 234/255, rxload 234/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive set (10 sec)
  Last input 00:00:05, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 40685000 bits/sec, 115624 packets/sec
  5 minute output rate 40685000 bits/sec, 115627 packets/sec
     4653081241 packets input, 204735493724 bytes, 0 no buffer
     Received 4044 broadcasts (0 IP multicast)
     0 runts, 0 giants, 0 throttles
```

```
          0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     4652915555 packets output, 204728203520 bytes, 0 underruns
     0 output errors, 0 applique, 4 interface resets
     0 output buffer failures, 0 output buffers swapped out
 2 carrier transitions
```

The table below describes the fields shown in the **show interfaces serial** output for a T3/E3 SPA.

Note The fields appearing in the ouput will vary depending on card type, interface configuration, and the status of the interface.

Table 13: show interfaces serial Field Descriptions--T3/E3 SPA

Field	Description
Serial	Name of the serial interface.
line protocol is	If the line protocol is up, the local router has received keepalive packets from the remote router. If the line protocol is down, the local router has not received keepalive packets form the remote router.
Hardware is	Designates the specific hardware type of the interface.
Internet address is	The IP address of the interface.
MTU	The maximum packet size set for the interface.
BW	Bandwidth in kilobits per second.
DLY	Interface delay in microseconds.
reliability	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
txload	Transmit load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
rxload	Receive load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
Encapsulation	Encapsulation method.
crc	CRC size in bits.
loopback	Indicates whether loopback is set.

Field	Description
keepalive	Indicates whether keepalives are set.
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. This counter is updated only when packets are process-switched, not when packets are fast-switched.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface. Useful for knowing when a dead interface failed. This counter is updated only when packets are process-switched, not when packets are fast-switched.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing of show interface counters	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. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 231 milliseconds (and less than 232 ms) ago.
Input queue	Packet statistics on the input queue reported as: • Size--Current size of the input queue. • Max--Maximum size of the input queue. • Drops--Packets dropped because the queue was full. • Flushes--Number of times that data on queue has been discarded.
Total output drops	Total number of dropped packets.

Field	Description
Queueing strategy	FIFO queueing strategy (other queueing strategies you might see are priority-list, custom-list, and weighted fair).
Output queue	Number of packets in the output queue (size), and the maximum size of the queue (max).
5-minute input rate	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 it sends and receives (rather than all network traffic). 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 will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
5-minute output rate	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 it sends and receives (rather than all network traffic). 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 will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.

Examples

The following is sample output from the **show interfaces tengigabitethernet** command for the only interface (port 0) in a 1-Port 10 Gigabit Ethernet SPA located in the top subslot (0) of the carrier card that is installed in slot 7 on a Cisco 12000 series router:

```
Router# show interfaces tengigabitethernet 7/0/0
TenGigabitEthernet7/0/0 is up, line protocol is up (connected)
  Hardware is TenGigEther SPA, address is 0000.0c00.0102 (bia 000f.342f.c340)
  Internet address is 10.1.1.2/24
  MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full-duplex, 10Gb/s
  input flow-control is on, output flow-control is on
ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:10, output hang never
```

```
Last clearing of "show interface" counters 20:24:30
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
L2 Switched: ucast: 0 pkt, 0 bytes - mcast: 0 pkt, 0 bytes
L3 in Switched: ucast: 0 pkt, 0 bytes - mcast: 0 pkt, 0 bytes mcast
L3 out Switched: ucast: 0 pkt, 0 bytes mcast: 0 pkt, 0 bytes
   237450882 packets input, 15340005588 bytes, 0 no buffer
   Received 25 broadcasts (0 IP multicasts)
   0 runts, 0 giants, 0 throttles
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
   0 watchdog, 0 multicast, 0 pause input
   0 input packets with dribble condition detected
   1676 packets output, 198290 bytes, 0 underruns
   0 output errors, 0 collisions, 4 interface resets
   0 babbles, 0 late collision, 0 deferred
   0 lost carrier, 0 no carrier, 0 PAUSE output
   0 output buffer failures, 0 output buffers swapped out
```

The table below describes the significant fields shown in the display.

Table 14: show interfaces tengigabitethernet Field Descriptions--10-Gigabit Ethernet SPA

Field	Description
TenGigabitEthernet...is up ...is administratively down	Indicates whether the interface hardware is currently active and if it has been taken down by an administrator.
line protocol is	Indicates whether the software processes that handle the line protocol consider the line usable or if it has been taken down by an administrator.
Hardware	Hardware type and MAC address.
Description	Alphanumeric string identifying the interface. This appears only if the **description** interface configuration command has been configured on the interface.
Internet address	Internet address followed by subnet mask.
MTU	Maximum transmission unit of the interface.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
reliability	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
txload, rxload	Load on the interface (in the transmit “tx” and receive “rx” directions) as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.

Field	Description
Encapsulation	Encapsulation method assigned to the interface.
loopback	Indicates whether loopback is set.
Keepalive	Indicates whether keepalives are set, and the time interval.
Half-duplex, Full-duplex	Indicates the duplex mode for the interface.
10Gb/s	Speed of the interface in Gigabits per second.
input flow control ...	Specifies if input flow control is on or off.
ARP type:	Type of ARP assigned and the timeout period.
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. This field is not updated by fast-switched traffic.
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.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the “last” fields exceeds 24 hours, the number of days and hours is displayed. If that field overflows, asterisks are printed.
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. A series of asterisks (***) indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 231 ms (and less than 232 ms) ago.

Field	Description
Input queue (size/max/drops/flushes)	Packet statistics on the input queue reported as: • Size--Number of packets in the input queue. • Max--Maximum size of the queue. • Drops--Number of packets dropped because of a full input queue. • Flushes--Number of packets dropped as part of SPD. SPD implements a selective packet drop policy on the router's IP process queue. Therefore, it applies only to process-switched traffic.
Total output drops	Total number of packets dropped because of a full output queue.
Queueing strategy	Type of Layer 3 queueing active on this interface. The default is FIFO.
Output queue (size/max)	Number of packets in the output queue (size), and the maximum size of the queue (max).
5 minute input rate, 5 minute output rate	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 it sends and receives (rather than all network traffic). 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 will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
L2 Switched	Provides statistics about Layer 2 switched traffic, including unicast and multicast traffic.
L3 in Switched	Provides statistics about received Layer 3 traffic.
L3 out Switched	Provides statistics about sent Layer 3 traffic.
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.

Field	Description
Received...broadcasts	Total number of broadcast or multicast packets received by the interface.
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.
throttles	Number of times the receiver on the port was disabled, possibly because of buffer or processor overload.
input errors	Includes runts, giants, no buffer, CRC, frame, overrun, and ignored counts. Other input-related errors can also cause the input errors count to be increased, and some datagrams may have more than one error; therefore, this sum may not balance with the sum of enumerated input error counts.
CRC	Cyclic redundancy check generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a LAN, this is usually the result of collisions or a malfunctioning Ethernet device.
overrun	Number of times the 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. These buffers are different than the system buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.
watchdog	Number of times the watchdog receive timer expired.
multicast	Number of multicast packets.

Field	Description
pause input	Number of pause packets received.
input packets with dribble condition detected	Dribble bit error indicates that a frame is slightly too long. This frame error counter is incremented for informational purposes only; the router accepts the frame.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, because some datagrams may have more than one error and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	Number of messages retransmitted because of an Ethernet collision. This is usually the result of an overextended LAN (Ethernet or transceiver cable too long, more than two repeaters between stations, or too many cascaded multiport transceivers). A packet that collides is counted only once in output packets.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. Interface resets can occur when an interface is looped back or shut down.
babbles	Transmit jabber timer expired.
late collision	Number of late collisions. Late collision happens when a collision occurs after transmitting the preamble.
deferred	Number of times that the interface had to defer while ready to transmit a frame because the carrier was asserted.
lost carrier	Number of times the carrier was lost during transmission.

Field	Description
no carrier	Number of times the carrier was not present during the transmission.
pause output	Number of pause packets transmitted.
output buffer failures, output buffers swapped out	Number of output butters failures and output buffers swapped out.

Examples

This example shows how to display traffic for a specific interface:

```
Router# show interfaces GigabitEthernet1/1

GigabitEthernet0/1 is up, line protocol is up
  Hardware is BCM1125 Internal MAC, address is 0016.9de5.d9d1 (bia 0016.9de5.d9d1)
  Internet address is 172.16.165.40/27
  MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:11, output 00:00:08, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     10 packets input, 2537 bytes, 0 no buffer
     Received 10 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 46 multicast, 0 pause input
     0 input packets with dribble condition detected
     18 packets output, 3412 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     7 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
     2 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

Note The unknown protocol drops field displayed in the above example refers to the total number of packets dropped due to unknown or unsupported types of protocol. This field occurs on several platforms such as the Cisco 3725, 3745, 3825, and 7507 series routers.

This example shows how to display traffic for a FlexWAN module:

```
Router# show interfaces pos 6/1/0.1

POS6/1/0.1 is up, line protocol is up
  Hardware is Packet over Sonet
  Internet address is 10.1.2.2/24
  MTU 4470 bytes, BW 155000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation FRAME-RELAY <<<+++ no packets info after this line
Arches#sh mod 6
Mod Ports Card Type                              Model             Serial No.
```

```
--- ----- ---------------------------------------- ------------------ -----------
  6    0  2 port adapter FlexWAN                    WS-X6182-2PA       SAD04340JY3
Mod MAC addresses                          Hw    Fw           Sw           Status
--- ---------------------------------- ------ ------------ ------------ -------
  6  0001.6412.a234 to 0001.6412.a273   1.3   12.2(2004022 12.2(2004022 Ok
Mod Online Diag Status
--- -------------------
  6 Pass
Router#
```

Related Commands

Command	Description
fair-queue	Enables WFQ.
interface	Configures an interface type and enters interface configuration mode.
show controllers fastethernet	Displays Fast Ethernet interface information, transmission statistics and errors, and applicable MAC destination address and VLAN filtering tables.
show controllers gigabitethernet	Displays Gigabit Ethernet interface information, transmission statistics and errors, and applicable MAC destination address and VLAN filtering tables.
show controllers pos	Displays information about the POS controllers.
show controllers serial	Displays controller statistics.

show interfaces port-channel

To display the information about the Fast EtherChannel on Cisco 7000 series routers with the RSP7000 and RSP7000CI, Cisco 7200 series routers, and Cisco 7500 series routers, use the **showinterfacesport-channel** command in user EXEC or privileged EXEC mode.

show interfaces port-channel commandshow interfaces port-channel [*channel-number*]

Syntax Description

channel-number	(Optional) Port channel number. Range is from 1 to 4.

Command Modes

User EXEC Privileged EXEC

Command History

Release	Modification
11.1 CA	This command was introduced.
12.1(5)T	This command was integrated into Cisco IOS Release 12.1(5)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

The following is sample output from the **showinterfacesport-channel** command:

Note By default the hardware type is set to Fast EtherChannel.The default MTU is set to 1500 bytes. The maximum MTU size that can be configured on the native Gigabit Ethernet ports on the Cisco 7200 series router is 9216. The range of configurable MTU value is from 1500 to 9216.

```
Router# show interfaces port-channel 1
Port-channel1 is up, line protocol is up
  Hardware is FEChannel, address is 0000.0ca8.6220 (bia 0000.0000.0000)
  MTU 1500 bytes, BW 400000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive not set, fdx
  ARP type: ARPA, ARP Timeout 04:00:00
    No. of active members in this channel: 4
        Member 0 : Fast Ethernet1/0/0
        Member 1 : Fast Ethernet1/1/0
        Member 2 : Fast Ethernet4/0/0
        Member 3 : Fast Ethernet4/1/0
  Last input 01:22:13, output never, output hang never
  Last clearing of "show interface" counters never
```

```
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     223 packets input, 11462 bytes, 0 no buffer
     Received 1 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast
     0 input packets with dribble condition detected
     192 packets output, 13232 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
```

The following sample output from the **showinterfacesport-channel** shows Gigabit EtherChannel as hardware type and the MTU value as 9216:

```
Router# show interface port-channel 1
Port-channel1 is up, line protocol is up
  Hardware is GEChannel
, address is 0001.c929.c41b (bia 0001.c929.c41b)
  MTU 9216 bytes
, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Unknown duplex, Unknown Speed, media type is unknown media type
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
    No. of active members in this channel: 1
        Member 0 : GigabitEthernet0/1 , Full-duplex, 1000Mb/s
    No. of Non-active members in this channel: 0
  Last input 00:00:04, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     95 packets input, 34383 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     1 packets output, 77 bytes, 0 underruns
     2 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

The table below describes significant fields shown in the display.

Table 15: show interfaces port-channel Field Descriptions

Field	Description
Port-channel1 is up, line protocol is up	Indicates if the interface hardware is currently active and can transmit and receive or if it has been taken down by an administrator.
Hardware is	Hardware type (Fast EtherChannel).
address is	Address being used by the interface.
MTU	Maximum transmission unit of the interface.

Field	Description
BW	Bandwidth of the interface, in kilobits per second.
DLY	Delay of the interface, in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes. The calculation uses the value from the **bandwidth** interface configuration command.
Encapsulation	Encapsulation method assigned to the interface.
loopback	Indicates if loopbacks are set.
keepalive	Indicates if keepalives are set.
fdx	Indicates the interface is operating in full-duplex mode.
ARA type	ARP type on the interface.
ARP timeout	Number of hours, minutes, and seconds an ARP cache entry will stay in the cache.
No. of active members in this channel: 4	Number of Fast Ethernet interfaces that are currently active (not down) and part of the Fast EtherChannel group.
Member 0: Fast Ethernet1/0/0	Specific Fast Ethernet interface that is part of the Fast EtherChannel group.
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. This counter is updated only when packets are process-switched, not when packets are fast-switched.
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface. This counter is updated only when packets are process-switched, not when packets are fast-switched.

Field	Description
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
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. Variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 231 ms (and less than 232 ms)) ago.
Queueing strategy	First-in, first-out queueing strategy (other queueing strategies you might see are priority-list, custom-list, and weighted fair).
Output queue, drops input queue, drops	Number of packets in output and input queues. Each number is followed by a slash, the maximum size of the queue, and the number of packets dropped because a queue was full.
5 minute input rate 5 minute output rate	Average number of bits and packets received or transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes (input)	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
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 LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of collisions or a station transmitting bad data. 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. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be incremented.
abort	Illegal sequence of ones bit on the interface.
watchdog	Number of times watchdog receive timer expired. It happens when receiving a packet with length greater than 2048.
multicast	Number of multicast packets received.

Field	Description
input packets with dribble condition detected	Dribble bit error indicates that a frame is slightly too long. This frame error counter is incremented just for informational purposes; the router accepts the frame.
packets output	Total number of messages transmitted by the system.
bytes (output)	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver can handle.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this might not balance with the sum of the enumerated output errors, as some datagrams can have more than one error, and others can have errors that do not fall into any of the specifically tabulated categories.
collisions	Number of messages retransmitted because of an Ethernet collision. A packet that collides is counted only once in output packets.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within a certain interval. If the system notices that the carrier detect line of an interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an unrecoverable interface processor error occurred, or when an interface is looped back or shut down.
babbles	The transmit jabber timer expired.
late collision	Number of late collisions. Late collision happens when a collision occurs after transmitting the preamble. The most common cause of late collisions is that your Ethernet cable segments are too long for the speed at which you are transmitting.
deferred	Deferred indicates that the chip had to defer while ready to transmit a frame because the carrier was asserted.
lost carrier	Number of times the carrier was lost during transmission.

Field	Description
no carrier	Number of times the carrier was not present during the transmission.
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.

Related Commands

Command	Description
interface multilink	Specifies a Fast EtherChannel and enters interface configuration mode.

show interfaces vlan mapping through show scp

show l2protocol-tunnel

To display the protocols that are tunneled on an interface or on all interfaces, use the **showl2protocol-tunnel** command.

show l2protocol-tunnel [**interface** *interface mod*/*port*| **summary**| **vlan** *vlan*]

Syntax Description

interface *interface-id*	(Optional) Specifies the interface type; possible valid values are **ethernet**, **FastEthernet**, **gigabitethernet**, **tengigabitethernet**, **pos**, **atm**, and **ge-wan**
mod/*port*	Module and port number.
summary	(Optional) Displays a summary of a tunneled port.
vlan*vlan*	(Optional) Limits the display to interfaces on the specified VLAN. Valid values are from 1 to 4094.

Command Modes

EXEC (>)

Privileged EXEC (#)

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17a)SX	The **showl2protocol-tunnelsummary** command output was changed to display the following information: • Global drop-threshold setting • Up status of a Layer 2-protocol interface tunnel
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to the 12.2 SX release.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXI	This command was changed to add the optional **vlan***vlan* keyword and argument.
15.2(2)T	This command was integrated into Cisco IOS Release 15.2(2)T.

Usage Guidelines

After enabling Layer 2 protocol tunneling on an access or IEEE 802.1Q tunnel port by using the l2protocol-tunnel interface configuration command, you can configure some or all of these parameters:

- Protocol type to be tunneled
- Shutdown threshold
- Drop threshold

The **showl2protocol-tunnel** command displays only the ports that have protocol tunneling enabled.

The **showl2protocol-tunnelsummary** command displays the ports that have protocol tunneling enabled, regardless of whether the port is down or currently configured as a trunk.

Examples

The following example is an output from the show l2protocol-tunnel command:

```
Router# show l2protocol-tunnel
COS for Encapsulated Packets: 5
```

```
Drop Threshold for Encapsulated Packets: 0
```

Port	Protocol	Shutdown Threshold	Drop Threshold	Encapsulation Counter	Decapsulation Counter	Drop Counter
Fa0/3	---	----	----	----	----	----
	---	----	----	----	----	----
	---	----	----	----	----	----
	pagp	----	----	0	242500	
	lacp	----	----	24268	242640	
	udld	----	----	0	897960	
Fa0/4	---	----	----	----	----	----
	---	----	----	----	----	----
	---	----	----	----	----	----
	pagp	1000	----	24249	242700	
	lacp	----	----	24256	242660	
	udld	----	----	0	1344820	
Gi0/3	cdp	----	----	134482	1344820	
	---	----	----	----	----	----
	---	----	----	----	----	----
	pagp	1000	----	0	242500	
	lacp	500	----	0	485320	
	udld	300	----	44899	448980	
Gi0/3	cdp	----	----	134482	1344820	

	---	----	----	----	----	----
	---	----	----	----	----	----
	pagp	----	1000	0	242700	
	lacp	----	----	0	485220	
	udld	300	----	44899	448980	

This example shows how to display a summary of Layer 2-protocol tunnel ports:

```
Router# show l2protocol-tunnel summary
COS for Encapsulated Packets:5
Drop Threshold for Encapsulated Packets:0
Port    Protocol    Shutdown         Drop             Status
                    Threshold        Threshold
                    (cdp/stp/vtp)    (cdp/stp/vtp)
------- ----------- ---------------- ---------------- ----------
Fa9/1   --- stp --- ----/----/----   ----/----/----   down
Fa9/9   cdp stp vtp ----/----/----   ----/----/----   up
Fa9/47  --- --- --- ----/----/----   1500/1500/1500   down(trunk)
Fa9/48  cdp stp vtp ----/----/----   ----/----/----   down(trunk)
```

This example shows how to display Layer 2-protocol tunnel information on interfaces for a specific VLAN:

```
Router# show l2protocol-tunnel vlan 1
COS for Encapsulated Packets: 5
Drop Threshold for Encapsulated Packets: 0
Protocol Drop Counter
-------- -------------
 cdp                 0
 lldp                0
 stp                 0
 vtp                 0
Port                Protocol Thresholds          Counters
                             Shutdown  Drop      Encap     Decap     Drop
------------------- -------- --------- --------- --------- --------- ---------
```

Related Commands

Command	Description
debug l2protocol-tunnel	Displays the debugging options for L2PT.
l2protocol-tunnel	Enables the protocol tunneling on an interface and specifies the type of protocol to be tunneled.
l2protocol-tunnel drop-threshold	Specifies the maximum number of packets that can be processed for the specified protocol on that interface before being dropped.
l2protocol-tunnel global drop-threshold	Enables rate limiting at the software level.

Command	Description
l2protocol-tunnel shutdown-threshold	Specifies the maximum number of packets that can be processed for the specified protocol on that interface in 1 second.

show lacp

To display Link Aggregation Control Protocol (LACP) and multi-chassis LACP (mLACP) information, use the **show lacp** command in either user EXEC or privileged EXEC mode.

show lacp {*channel-group-number* {**counters**| **internal [detail]**| **neighbor [detail]**}| **multi-chassis [load-balance]** {**group** *number*| **port-channel** *number*}| **sys-id**}

Cisco ASR 901 Series Aggregation Services Router

show lacp {*channel-group-number* {**counters**| **internal [detail]**| **neighbor [detail]**| **sys-id**}}

Syntax Description

channel-group- number	(Optional) Number of the channel group. The following are valid values: • Cisco IOS 12.2 SB and Cisco IOS XE 2.4 Releases--from 1 to 64 • Cisco IOS 12.2 SR Releases--from 1 to 308 • Cisco IOS 12.2 SX Releases--from 1 to 496 • Cisco IOS 15.1S Releases—from 1 to 564 • Cisco ASR 901 Series Aggregation Services Router—from 1 to 8
counters	Displays information about the LACP traffic statistics.
internal	Displays LACP internal information.
neighbor	Displays information about the LACP neighbor.
detail	(Optional) Displays detailed internal information when used with the **internal** keyword and detailed LACP neighbor information when used with the **neighbor** keyword.
multi-chassis	Displays information about mLACP.
load-balance	Displays mLACP load balance information.
group	Displays mLACP redundancy group information,

number	Integer value used with the **group** and **port-channel** keywords. • Values from 1 to 4294967295 identify the redundancy group. • Values from 1 to 564 identify the port-channel interface.
port-channel	Displays mLACP port-channel information.
sys-id	Displays the LACP system identification. It is a combination of the port priority and the MAC address of the device

Command Modes

User EXEC (>) Privileged EXEC (#)

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Cisco IOS Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
12.2(33)SRE	This command was modified. The **multi-chassis**, **group**, and **port-channel**keywords and *number* argument were added.
15.1(3)S	This command was modified. The **load-balance** keyword was added.
15.1(2)SNG	This command was implemented on the Cisco ASR 901 Series Aggregation Services Router.

Usage Guidelines

Use the **show lacp** command to troubleshoot problems related to LACP in a network.

If you do not specify a value for the argument *channel-group-number*, all channel groups are displayed. Values in the range of 257 to 282 are supported on the CSM and the FWSM only.

Examples

Examples

This example shows how to display the LACP system identification using the **show lacp sys-id**command:

```
Device> show lacp sys-id

8000,AC-12-34-56-78-90
```

The system identification is made up of the system priority and the system MAC address. The first two bytes are the system priority, and the last six bytes are the globally administered individual MAC address that is associated to the system.

Examples

This example shows how to display the LACP statistics for a specific channel group:

```
Device# show lacp 1 counters

               LACPDUs          Marker       LACPDUs
Port       Sent   Recv     Sent   Recv     Pkts Err
---------------------------------------------------
Channel group: 1
  Fa4/1    8      15       0      0          3    0
  Fa4/2    14     18       0      0          3    0
  Fa4/3    14     18       0      0          0
  Fa4/4    13     18       0      0          0
```

The output displays the following information:

- The LACPDUs Sent and Recv columns display the LACPDUs that are sent and received on each specific interface.
- The LACPDUs Pkts and Err columns display the marker-protocol packets.

The following example shows output from a **show lacp***channel-group-number***counters**command:

```
Device1# show lacp 5 counters

              LACPDUs          Marker      Marker Response    LACPDUs
Port       Sent   Recv     Sent   Recv     Sent   Recv      Pkts Err
---------------------------------------------------------------------
Channel group: 5
Gi5/0/0     21     18       0      0        0      0         0
```

The following table describes the significant fields shown in the display.

Table 16: show lacp channel-group-number counters Field Descriptions

Field	Description
LACPDUs Sent Recv	Number of LACP PDUs sent and received.
Marker Sent Recv	Attempts to avoid data loss when a member link is removed from an LACP bundle.
Marker Response Sent Recv	Cisco IOS response to the Marker protocol.
LACPDUs Pkts Err	Number of LACP PDU packets transmitted and the number of packet errors.

The following example shows output from a **show lacp internal**command:

```
Device1# show lacp 5 internal

Flags:  S - Device is requesting Slow LACPDUs
        F - Device is requesting Fast LACPDUs
        A - Device is in Active mode       P - Device is in Passive mode
Channel group 5
                            LACP port     Admin     Oper    Port         Port
Port      Flags   State     Priority      Key       Key     Number       State
Gi5/0/0   SA      bndl      32768         0x5       0x5     0x42         0x3D
```

The following table describes the significant fields shown in the display.

Table 17: show lacp internal Field Descriptions

Field	Description
Flags	Meanings of each flag value, which indicates a device activity.
Port	Port on which link bundling is configured.
Flags	Indicators of device activity.
State	Activity state of the port. States can be any of the following: • Bndl--Port is attached to an aggregator and bundled with other ports. • Susp--Port is in suspended state, so it is not attached to any aggregator. • Indep--Port is in independent state (not bundled but able to switch data traffic). This condition differs from the previous state because in this case LACP is not running on the partner port. • Hot-sby--Port is in hot standby state. • Down--Port is down.
LACP port Priority	Priority assigned to the port.
Admin Key	Defines the ability of a port to aggregate with other ports.
Oper Key	Determines the aggregation capability of the link.
Port Number	Number of the port.

Field	Description
Port State	State variables for the port that are encoded as individual bits within a single octet with the following meaning: • bit0: LACP_Activity • bit1: LACP_Timeout • bit2: Aggregation • bit3: Synchronization • bit4: Collecting • bit5: Distributing • bit6: Defaulted • bit7: Expired

Examples

This example shows how to display internal information for the interfaces that belong to a specific channel:

```
Device# show lacp 1 internal

Flags:  S - Device sends PDUs at slow rate. F - Device sends PDUs at fast rate.
        A - Device is in Active mode.       P - Device is in Passive mode.
Channel group 1
                            LACPDUs     LACP Port    Admin   Oper    Port     Port
Port      Flags    State    Interval    Priority     Key     Key     Number   State
Fa4/1     saC      bndl     30s         32768        100     100     0xc1     0x75
Fa4/2     saC      bndl     30s         32768        100     100     0xc2     0x75
Fa4/3     saC      bndl     30s         32768        100     100     0xc3     0x75
Fa4/4     saC      bndl     30s         32768        100     100     0xc4     0x75
Device#
```

The following table describes the significant fields shown in the display.

Table 18: show lacp internal Field Descriptions

Field	Description
State	Current state of the port; allowed values are as follows: • bndl--Port is attached to an aggregator and bundled with other ports. • susp--Port is in a suspended state; it is not attached to any aggregator. • indep--Port is in an independent state (not bundled but able to switch data traffic. In this case, LACP is not running on the partner port). • hot-sby--Port is in a hot-standby state. • down--Port is down.
LACPDUs Interval	Interval setting.
LACP Port Priority	Port-priority setting.
Admin Key	Defines the ability of a port to aggregate with other ports.
Oper Key	Determines the aggregation capability of the link.
Port Number	Port number.
Port State	Activity state of the port. • See the Port State description in the show lacp internal Field Descriptions table for state variables.

Examples

This example shows how to display the information about the LACP neighbors for a specific port channel:

```
Device# show lacp 1 neighbors

Flags:  S - Device sends PDUs at slow rate. F - Device sends PDUs at fast rate.
        A - Device is in Active mode.       P - Device is in Passive mode.
Channel group 1 neighbors
          Partner                Partner
Port      System ID              Port Number     Age     Flags
Fa4/1     8000,00b0.c23e.d84e     0x81            29s     P
Fa4/2     8000,00b0.c23e.d84e     0x82            0s      P
Fa4/3     8000,00b0.c23e.d84e     0x83            0s      P
Fa4/4     8000,00b0.c23e.d84e     0x84            0s      P
          Port          Admin     Oper      Port
          Priority      Key       Key       State
Fa4/1     32768         200       200       0x81
```

```
Fa4/2      32768          200        200        0x81
Fa4/3      32768          200        200        0x81
Fa4/4      32768          200        200        0x81
Device#
```

The following table describes the significant fields shown in the display.

Table 19: show lacp neighbors Field Descriptions

Field	Description
Port	Port on which link bundling is configured.
Partner System ID	Peer's LACP system identification (sys-id). It is a combination of the system priority and the MAC address of the peer device.
Partner Port Number	Port number on the peer device
Age	Number of seconds since the last LACP PDU was received on the port.
Flags	Indicators of device activity.
Port Priority	Port priority setting.
Admin Key	Defines the ability of a port to aggregate with other ports.
Oper Key	Determines the aggregation capability of the link.
Port State	Activity state of the port. See the Port State description in the show lacp internal Field Descriptions table for state variables.

If no PDUs have been received, the default administrative information is displayed in braces.

Related Commands

Command	Description
clear lacp counters	Clears the statistics for all interfaces belonging to a specific channel group.
lacp port-priority	Sets the priority for the physical interfaces.
lacp system-priority	Sets the priority of the system.

show link state group

To display the link-state group information., use the **showlinkstategroup** command in user EXEC or privileged EXEC mode .

show link state group detail

Syntax Description

detail	Displays the detailed information about the group.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
15.1(1)S	This command was introduced.

Usage Guidelines

Link State Ttracking (LST), also known as trunk failover, is a feature that binds the link state of multiple interfaces. When you configure LST for the first time, add upstream interfaces to the link state group before adding the downstream interface, otherwise the downstream interfaces would move into error-disable mode. The maximum number of link state groups configurable is 10.

Examples

The following example displays the link-state group information:

```
Router# enable
Router# show link state group 1
Link State Group: 1 Status: Enabled, Down
Router> show link state group detail
(Up):Interface up (Dwn):Interface Down (Dis):Interface disabled
Link State Group: 1 Status: Enabled, Down
Upstream Interfaces : Gi3/5(Dwn) Gi3/6(Dwn)
Downstream Interfaces : Gi3/1(Dis) Gi3/2(Dis) Gi3/3(Dis) Gi3/4(Dis)
Link State Group: 2 Status: Enabled, Down
Upstream Interfaces : Gi3/15(Dwn) Gi3/16(Dwn) Gi3/17(Dwn)
Downstream Interfaces : Gi3/11(Dis) Gi3/12(Dis) Gi3/13(Dis) Gi3/14(Dis)
(Up):Interface up (Dwn):Interface Down (Dis):Interface disabled
```

Related Commands

Command	Description
link state track	Configures the link state tracking number.
link state group	Configures the link state group and interface, as either an upstream or downstream interface in the group.

show mac-address-table dynamic

To display dynamic MAC address table entries only, use the **showmac-address-tabledynamic** command in privileged EXEC mode.

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

show mac-address-table dynamic [**address** *mac-addr*| **interface** *interface type slot/number* | **vlan** *vlan*]

Catalyst Switches

show mac-address-table dynamic [**address** *mac-addr*| **detail**| **interface** *interface number***protocol** *protocol* | **module** *number*| **vlan** *vlan*][**begin**| **exclude**| **include**| *expression*]

Catalyst 6500 Series Switches

show mac-address-table dynamic [**address** *mac-addr*| **interface** *interface interface-number* [**all**| **module** *number*]| **module** *num*| **vlan** *vlan-id* [**all**| **module** *number*]]

Syntax Description

address *mac -address*	(Optional) Specifies a 48-bit MAC address; valid format is H.H.H.
detail	(Optional) Specifies a detailed display of MAC address table information.
interface *type number*	(Optional) Specifies an interface to match; valid type values are FastEthernet and GigabitEthernet, valid number values are from 1 to 9.
interface *type*	(Optional) Specifies an interface to match; valid type values are FastEthernet and GigabitEthernet.
slot	(Optional) Adds dynamic addresses to module in slot 1 or 2.
port	(Optional) Port interface number ranges based on type of Ethernet switch network module used: • 0 to 15 for NM-16ESW • 0 to 35 for NM-36ESW • 0 to 1 for GigabitEthernet
protocol *protocol*	(Optional) Specifies a protocol. See the "Usage Guidelines" section for keyword definitions.
module *number*	(Optional) Displays information about the MAC address table for a specific Distributed Forwarding Card (DFC) module.

vlan *vlan*	(Optional) Displays entries for a specific VLAN; valid values are from 1 to 1005.
begin	(Optional) Specifies that the output display begin with the line that matches the expression.
exclude	(Optional) Specifies that the output display exclude lines that match the expression.
include	(Optional) Specifies that the output display include lines that match the specified expression.
expression	Expression in the output to use as a reference point.
all	(Optional) Specifies that the output display all dynamic MAC-address table entries.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.0(7)XE	This command was introduced on Catalyst 6000 series switches.
12.2(2)XT	This command was implemented on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(14)SX	Support for this command was introduced on the Catalyst 6500 series switch.
12.2(33)SXH	This command was changed to support the **all** keyword on the Catalyst 6500 series switch.

Usage Guidelines

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

The **showmac-address-tabledynamic** command output for an EtherChannel interface changes the port-number designation (for example, 5/7) to a port-group number.

Catalyst Switches

The keyword definitions for the protocol argument are:

- **ip** --Specifies IP protocol
- **ipx** --Specifies Internetwork Packet Exchange (IPX) protocols
- **assigned** --Specifies assigned protocol entries
- **other** --Specifies other protocol entries

The **showmac-address-tabledynamic** command output for an EtherChannel interface changes the port-number designation (for example, 5/7) to a port-group number.

Catalyst 6500 Series Switches

The *mac-address*is a 48-bit MAC address and the valid format is H.H.H.

The optional **module***num* keyword and argument are supported only on DFC modules. The **module***num*keyword and argument designate the module number.

Examples

The following examples show how to display all dynamic MAC address entries. The fields shown in the various displays are self-explanatory.

Examples

```
Router# show mac-address-table dynamic

Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
000a.000a.000a          Dynamic       1     FastEthernet4/0
002a.2021.4567          Dynamic       2     FastEthernet4/0
```

Examples

```
Router# show mac-address-table dynamic
vlan   mac address     type    protocol  qos             ports
-----+---------------+--------+---------+---+--------------------------------
 200  0010.0d40.37ff  dynamic        ip  --  5/8
   1  0060.704c.73ff  dynamic        ip  --  5/9
4095  0000.0000.0000  dynamic        ip  --  15/1
   1  0060.704c.73fb  dynamic     other  --  5/9
   1  0080.1c93.8040  dynamic        ip  --  5/9
4092  0050.f0ac.3058  dynamic        ip  --  15/1
   1  00e0.4fac.b3ff  dynamic     other  --  5/9
```

The following example shows how to display dynamic MAC address entries with a specific protocol type (in this case, assigned).

```
Router# show mac-address-table dynamic protocol assigned
vlan   mac address     type    protocol  qos             ports
-----+---------------+--------+---------+---+--------------------------------
4092  0000.0000.0000  dynamic  assigned  --  Router
4092  0050.f0ac.3059  dynamic  assigned  --  Router
   1  0010.7b3b.0978  dynamic  assigned  --  Fa5/9
Router#
```

The following example shows the detailed output for the previous example.

```
Router# show mac-address-table dynamic protocol assigned detail
MAC Table shown in details
=========================================
 Type   Always Learn Trap Modified Notify Capture Protocol Flood
-------+------------+----+--------+------+-------+--------+-----+
     QoS bit      L3 Spare   Mac Address  Age Byte Pvlan Xtag SWbits Index
-----------------+--------+--------------+--------+-----+----+------+-----
DYNAMIC     NO        NO     YES     NO     NO    assigned   NO
   Bit Not On        0     0000.0000.0000  255      4092   0     0     0x3
```

```
DYNAMIC     NO        NO     YES     NO     NO    assigned   NO
   Bit Not On        0     0050.f0ac.3059  254      4092   0     0     0x3

DYNAMIC     NO        NO     YES     NO     NO    assigned   NO
   Bit Not On        0     0010.7b3b.0978  254      1      0     0     0x108

Router#
```

Examples

This example shows how to display all the dynamic MAC-address entries for a specific VLAN.

```
Router# show mac-address-table dynamic vlan 200 all
Legend: * - primary entry
        age - seconds since last seen
        n/a - not aevailable
vlan     mac address      type   learn    age               ports
------+----------------+--------+-----+----------+--------------------------
 200  0010.0d40.37ff   dynamic    NO      23        Gi5/8
Router#
```

This example shows how to display all the dynamic MAC-address entries.

```
Router# show mac-address-table dynamic
Legend: * - primary entry
age - seconds since last seen
n/a - not applicable
vlan     mac address      type   learn    age               ports
------+----------------+--------+-----+----------+--------------------------
* 10   0010.0000.0000   dynamic  Yes   n/a        Gi4/1
* 3    0010.0000.0000   dynamic  Yes   0          Gi4/2
* 1    0002.fcbc.ac64   dynamic  Yes   265        Gi8/1
* 1    0009.12e9.adc0   static   No    -          Router
Router#
```

Related Commands

Command	Description
show mac -address-tableaddress	Displays MAC address table information for a specific MAC address.
show mac -address-tableaging-time	Displays the MAC address aging time.
show mac -address-tablecount	Displays the number of entries currently in the MAC address table.
show mac -address-tabledetail	Displays detailed MAC address table information.
show mac -address-tableinterface	Displays the MAC address table information for a specific interface.
show mac -address-tablemulticast	Displays multicast MAC address table information.
show mac -address-tableprotocol	Displays MAC address table information based on protocol.
show mac -address-tablestatic	Displays static MAC address table entries only.
show mac -address-tablevlan	Displays the MAC address table information for a specific VLAN.

show pagp

To display port-channel information, use the **show pagp** command in user EXEC or privileged EXEC mode.

show pagp [*group-number*] {**counters**| **internal**| **neighbor**| **pgroup**}

Syntax Description

group-number	(Optional) Channel-group number; valid values are a maximum of 64 values from 1 to 282.
counters	Displays the traffic information.
internal	Displays the internal information.
neighbor	Displays the neighbor information.
pgroup	Displays the active port channels.

Command Default

This command has no default settings.

Command Modes

User EXEC Privileged EXEC

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

You can enter any **show pagp** command to display the active port-channel information. To display the nonactive information, enter the **show pagp** command with a group.

The **port-channel** *number*values from 257 to 282 are supported on the CSM and the FWSM only.

Examples

This example shows how to display information about the PAgP counters:

```
Router#
show pagp
 counters
          Information        Flush
Port      Sent   Recv     Sent   Recv
```

```
---------------------------------------
Channel group: 1
  Fa5/4    2660   2452     0      0
  Fa5/5    2676   2453     0      0
Channel group: 2
  Fa5/6    289    261      0      0
  Fa5/7    290    261      0      0
Channel group: 1023
  Fa5/9    0      0        0      0
Channel group: 1024
  Fa5/8    0      0        0      0
Router#
```

This example shows how to display internal PAgP information:

```
Router# show pagp
 1 internal
Flags:  S - Device is sending Slow hello.  C - Device is in Consistent state.
        A - Device is in Auto mode.
Timers: H - Hello timer is running.        Q - Quit timer is running.
        S - Switching timer is running.    I - Interface timer is running.
Channel group 1
                              Hello    Partner  PAgP     Learning
Port      Flags State   Timers  Interval Count   Priority  Method
Fa5/4     SC    U6/S7           30s      1        128      Any
Fa5/5     SC    U6/S7           30s      1        128      Any
Router#
```

This example shows how to display PAgP-neighbor information for all neighbors:

```
Router# show pagp
 neighbor
Flags:  S - Device is sending Slow hello.  C - Device is in Consistent state.
        A - Device is in Auto mode.        P - Device learns on physical port.
Channel group 1 neighbors
          Partner              Partner          Partner         Partner Group
Port      Name                 Device ID        Port       Age  Flags   Cap.
Fa5/4     JAB031301            0050.0f10.230c   2/45         2s SAC     2D
Fa5/5     JAB031301            0050.0f10.230c   2/46        27s SAC     2D
Channel group 2 neighbors
          Partner              Partner          Partner         Partner Group
Port      Name                 Device ID        Port       Age  Flags   Cap.
Fa5/6     JAB031301            0050.0f10.230c   2/47        10s SAC     2F
Fa5/7     JAB031301            0050.0f10.230c   2/48        11s SAC     2F
Channel group 1023 neighbors
          Partner              Partner          Partner         Partner Group
Port      Name                 Device ID        Port       Age  Flags   Cap.
Channel group 1024 neighbors
          Partner              Partner          Partner         Partner Group
Port      Name                 Device ID        Port       Age  Flags   Cap.
Router#
```

Related Commands

Command	Description
pagp learn-method	Learns the input interface of the incoming packets.
pagp port-priority	Selects a port in hot standby mode.

show power inline

To display the power status for a specified port or for all ports, use the **showpowerinline** command in privileged EXEC mode.

show power inline [*interface-type slot*/*port*] [**actual**| **configured**]

Syntax Description

interface -type	(Optional) Type of interface.
slot	(Optional) Slot number.
/ *port*	(Optional) Port number.
actual	(Optional) Displays the present power status, which might not be the same as the configured power.
configured	(Optional) Displays the configured power status.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(5)XU	This command was introduced.
12.2(2)XT	This command was introduced on the Cisco 2600 series, the Cisco 3600 series, and the Cisco 3700 series routers to support switchport creation.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T to support switchport creation on Cisco 2600 series, the Cisco 3600 series, and Cisco 3700 series routers.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
XE 3.8	This command was integrated into Cisco IOS Release XE 3.8(to be changed) to support Cisco 4950 Series ISR-XE routers..

Usage Guidelines

The **showpowerinline** command displays the amount of power used to operate a Cisco IP phone. To view the amount of power requested, use the **showcdpneighbors** command.

Examples

The following is sample output from the**showpowerinlinefa0/4actual** command asking for the actual status of each interface rather than what is configured for each:

```
Router#
show power inline fastethernet 0/4 actual
Interface              Power
---------------------- -----
FastEthernet0/4        no
```

Notice that the status shown for the FastEthernet interface 0/4, there is no power.

Related Commands

Command	Description
power inline	Determines how inline power is applied to devices on the specified Fast Ethernet port.
show cdp neighbors	Displays detailed information about neighboring devices discovered using CDP.

show service-module serial through standby port

snmp trap illegal-address

To issue a Simple Network Management Protocol (SNMP) trap when a MAC address violation is detected on an Ethernet hub port of a Cisco 2505, Cisco 2507, or Cisco 2516 router, use the **snmptrapillegal-address** command in hub configuration mode. To disable this function, use the **no** form of this command.

snmp trap illegal-address

no snmp trap illegal-address

Syntax Description

This command has no arguments or keywords.

Command Default

No SNMP trap is issued.

Command Modes

Hub configuration

Command History

Release	Modification
11.1	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

In addition to setting the **snmptrapillegal-address**command on the Ethernet hub, you can set the frequency that the trap is sent to the network management station (NMS). This is done on the NMS via the Cisco Repeater MIB. The frequency of the trap can be configured for once only or at a decaying rate (the default). If the decaying rate is used, the first trap is sent immediately, the second trap is sent after one minute, the third trap is sent after two minutes, and so on until 32 minutes, at which time the trap is sent every 32 minutes. If you use a decaying rate, you can also set the trap acknowledgment so that the trap will be acknowledged after it is received and will no longer be sent to the network management station.

Because traps are not reliable, additional information on a port basis is provided by the Cisco Repeater MIB. The network management function can query the following information: the last illegal MAC source address, the illegal address trap acknowledgment, the illegal address trap enabled, the illegal address first heard (timestamp), the illegal address last heard (timestamp), the last illegal address trap count for the port, and the illegal address trap total count for the port.

In addition to issuing a trap when a MAC address violation is detected, the port is also disabled as long as the MAC address is invalid. The port is enabled and the trap is no longer sent when the MAC address is valid (that is, either the address was configured correctly or learned).

Examples

The following example enables an SNMP trap to be issued when a MAC address violation is detected on hub ports 2, 3, or 4. SNMP support must already be configured on the router.

```
Router(config)#
 hub ethernet 0 2 4
Router(config-hub)#
 snmp trap illegal-address
```

Related Commands

Command	Description
hub	Enables and configures a port on an Ethernet hub of a Cisco 2505 or Cisco 2507 router.

speed

To configure the speed for a Fast Ethernet or Gigabit Ethernet interface, use the **speed** command in interface configuration mode. To return to the default setting, use the **no** form of this command.

speed {**10**| **100**| **1000 [negotiate]**| **auto** [*speed-list*]}

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. This keyword is valid only for interfaces that support Gigabit Ethernet.
auto	Enables Fast Ethernet autonegotiation. The interface automatically operates at 10 Mbps or 100 Mbps depending on environmental factors, such as the type of media and transmission speeds for the peer routers, hubs, and switches used in the network configuration. Autonegotiation is the default.
nonegotiate	(Optional) Enables or disables the link-negotiation protocol on the Gigabit Ethernet ports.
speed-list	(Optional) Speed autonegotiation capability to a specific speed; see the "Usage Guidelines" section for valid values.

Command Default

auto

Command Modes

Interface configuration

Command History

Release	Modification
11.2(10)P	This command was introduced.
12.1(7)E	The **1000** keyword was added for Gigabit Ethernet interfaces.
12.2S	This command was integrated into Cisco IOS Release 12.2 S.

Release	Modification
12.2(20)S2	This command was implemented on the 4-Port 10/100 Fast Ethernet SPA and the 2-Port 10/100/1000 Gigabit Ethernet SPA on the Cisco 7304 router.
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17a)SX	This command was changed to include the *speed-list* argument.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to the 12.2 SX release.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Use the **speed** [**10** | **100**] command for 10/100 ports, the **speedauto** [**10100** [**1000**]] c ommand for 10/100/1000 ports, and the **speed** [**1000** | **nonegotiate**] command for Gigabit Ethernet ports.

Cisco 7600 Series Routers

Cisco 7600 series routers cannot automatically negotiate interface speed and duplex mode if either connecting interface is configured to a value other than **auto**.

Ethernet Interfaces

If you set the Ethernet interface speed to **auto** on a 10/100-Mbps or 10/100/1000-Mbps Ethernet interface, both speed and duplex are autonegotiated.

Gigabit Ethernet Interfaces

The Gigabit Ethernet interfaces are full duplex only. You cannot change the duplex mode on the Gigabit Ethernet interfaces or on a 10/100/1000-Mbps interface that is configured for Gigabit Ethernet.

SPA Interfaces

The **speed** command applies to SPA interfaces that are using RJ-45 media. Gigabit Ethernet interfaces using fiber media support 1000-Mbps speed only, and use the **negotiation** command to enable and disable autonegotiation.

See also Flow Control in this Usage Guidelines section.

Speed Command Syntax Combinations

The table below lists the supported command options by interface.

Table 20: Supported speed Command Options

Interface Type	Supported Syntax	Default Setting	Usage Guidelines
10/100-Mbps module	**speed** [**10** | **100** **speed auto** [**10** | **100**	**auto**	If the speed is set to **auto**, you cannot set **duplex**. If the speed is set to **10** or **100**, and you do not configure the duplex setting, the duplex is set to **half.**

Interface Type	Supported Syntax	Default Setting	Usage Guidelines
10/100/1000-Mbps interface	**speed** auto [{ 10 100} [1000]]	**auto**	If the speed is set to **auto**, you cannot set **duplex**. If the speed is set to **10** or **100**, and you do not configure the duplex setting, the duplex is set to **half** by default . If the speed is set to **10100**, the interface is not forced to half duplex by default.
100-Mbps fiber modules	Factory set	Not applicable.	
Gigabit Ethernet module	**speed** [**1000** | **nonegotiate**	Speed is 1000 or negotiation is enabled.	Speed, duplex, flow control, and clocking negotiations are enabled.
10-Mbps ports	Factory set	Not applicable.	

Autonegotiation

To enable the autonegotiation capability on an RJ-45 interface, you must set either the **speed** command or the **duplex** command to **auto**. The default configuration is that both commands are set to **auto**.

If you need to force an interface port to operate with certain settings and therefore disable autonegotiation, you must be sure that the remote link is configured for compatible link settings for proper transmission. This includes support of flow control on the link.

When you enable link negotiation, the speed, duplex, flow control, and clocking negotiations between two Gigabit Ethernet ports are automatically enabled.

Flow Control

Flow control support is always advertised when autonegotiation is enabled.

Every interface on a 4-Port 10/100 Fast Ethernet SPA supports transmission of pause frames to stop packet flow when the MSC is full. You cannot disable flow control for an interface on the 4-Port 10/100 Fast Ethernet SPA. Therefore, flow control support is not configurable, but it is advertised during autonegotiaton.

If you disable autonegotiation, then you must be sure that the remote device is configured to support flow control because flow control is automatically enabled for all interfaces on the 4-Port 10/100 Fast Ethernet SPA.

Speed Settings

Separate the *speed-list* entries with a space.

When manually configuring the interface speed to either 10 or 100 Mbps, the switch prompts you to configure duplex mode on the interface.

The following *speed-list*configurations are supported:

- **speed auto** --Negotiate all speeds.

- **speed auto 10 100** --Negotiate 10 and 100 speeds only.
- **speed auto 10 100 1000** --Negotiate all speeds.

Speed and Duplex Combinations

The table below describes the interface behavior for various combinations of the **duplex** and **speed** command settings. The specified **duplex** command configured with the specified **speed** command produces the resulting system action.

If you decide to configure the interface speed and duplex commands manually, and enter a value other than **speedauto** (for example, 10 or 100 Mbps), ensure that you configure the connecting interface speed command to a matching speed but do not use the **auto** keyword.

If you specify both a **duplex** and **speed** setting other than **auto**on an RJ-45 interface, then autonegotiation is disabled for the interface.

You cannot set the duplex mode to **half** when the port speed is set at 1000 and similarly, you cannot set the port speed to **1000** when the mode is set to half duplex. In addition, if the port speed is set to **auto**, the **duplex** command is rejected.

Caution Changing the interface speed and duplex mode might shut down and reenable the interface during the reconfiguration.

Table 21: Relationship Between duplex and speed Commands

duplex Command	speed Command	Resulting System Action
duplex auto	**speed auto**	Autonegotiates both speed and duplex mode. The interface advertises capability for the following link settings: • 10 Mbps and half duplex • 10 Mbps and full duplex • 100 Mbps and half duplex • 100 Mbps and full duplex • 1000 Mbps and half duplex (Gigabit Ethernet only) • 1000 Mbps and full duplex (Gigabit Ethernet only)

duplex Command	speed Command	Resulting System Action
duplex auto	**speed 10** or**speed100**or**speed1000**	Autonegotiates the duplex mode. The interface advertises capability for the configured speed with capability for both half-duplex or full-duplex mode. For example, if the **speed100**command is configured with **duplexauto**, then the interface advertises the following capability: • 100 Mbps and half duplex • 100 Mbps and full duplex
duplex half or**duplexfull**	**speed auto**	Autonegotiates the speed. The interface advertises capability for the configured duplex mode with capability for both 10-Mbps or 100-Mbps operation for Fast Ethernet interfaces, and 10-Mbps, 100-Mbps, and 1000-Mbps for Gigabit Ethernet interfaces. For example, if the **duplexfull**command is configured with the **speedauto** command, then the interface advertises the following capability: • 10 Mbps and full duplex • 100 Mbps and full duplex • 1000 Mbps and full duplex (Gigabit Ethernet interfaces only)
duplex half	**speed 10**	Forces 10-Mbps and half-duplex operation, and disables autonegotiation on the interface.
duplex full	**speed 10**	Forces 10-Mbps and full-duplex operation, and disables autonegotiation on the interface.
duplex half	**speed 100**	Forces 100-Mbps and half-duplex operation, and disables autonegotiation on the interface.

duplex Command	speed Command	Resulting System Action
duplex full	**speed 100**	Forces 100-Mbps and full-duplex operation, and disables autonegotiation on the interface.
duplex half	**speed 1000**	Forces 1000-Mbps and half-duplex operation, and disables autonegotiation on the interface (Gigabit Ethernet only).
duplex full	**speed 1000**	Forces 1000-Mbps and full-duplex operation, and disables autonegotiation on the interface (Gigabit Ethernet only).

Examples

The following example specifies advertisement of 10 Mbps operation only, and either full-duplex or half-duplex capability during autonegotiation for the second interface (port 1) on the SPA located in the bottom subslot (1) of the MSC that is installed in slot 2 of the Cisco 7304 router:

```
Router# configure terminal
Router(config)# interface fastethernet 2/1/1
Router(config-if)# speed 10
Router(config-if)# duplex auto
```

With this configuration, the interface advertises the following capabilities during autonegotiation:

- 10 Mbps and half duplex
- 10 Mbps and full duplex

Related Commands

Command	Description
duplex	Configures the duplex operation on an interface.
interface fastethernet	Selects a particular Fast Ethernet interface for configuration.
interface gigabitethernet	Selects a particular Gigabit Ethernet interface for configuration.
show controllers fastethernet	Displays Fast Ethernet interface information, transmission statistics and errors, and applicable MAC destination address and VLAN filtering tables.
show controllers gigabitethernet	Displays Gigabit Ethernet interface information, transmission statistics and errors, and applicable MAC destination address and VLAN filtering tables.

Command	Description
show interfaces fastethernet	Displays information about the Fast Ethernet interfaces.
show interfaces gigabitethernet	Displays information about the Gigabit Ethernet interfaces.

squelch through system jumbomtu

switchport

Cisco 3550, 4000, and 4500 Series Switches

To put an interface that is in Layer 3 mode into Layer 2 mode for Layer 2 configuration, use the **switchport**command in interface configuration mode. To put an interface into Layer 3 mode, use the **no** form of this command.

switchport

no switchport

Cisco Catalyst 6500/6000 Series Switches and Cisco 7600 Series Routers

To modify the switching characteristics of the Layer 2-switched interface, use the **switchport** command (without keywords). Use the **no** form of this command (without keywords) to return the interface to the routed-interface status and cause all further Layer 2 configuration to be erased. Use the **switchport** commands (with keywords) to configure the switching characteristics.

switchport

switchport {**host**| **nonegotiate**}

no switchport

no switchport nonegotiate

Syntax Description

This command has no arguments or keywords.

Syntax Description

host	Optimizes the port configuration for a host connection.
nonegotiate	Specifies that the device will not engage in negotiation protocol on this interface.

Command Default

All interfaces are in Layer 2 mode.

Catalyst 6500/6000 Series Switches and 7600 Series Routers

The default access VLAN and trunk-interface native VLAN are default VLANs that correspond to the platform or interface hardware.

Command Modes

Interface configuration

Command History

Release	Modification
12.1(4)EA1	This command was introduced.
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(15)ZJ	This command was implemented on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Cisco IOS Release 12.2(17d)SXB.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T on the following platforms: Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
15.1(2)T	Support for IPv6 was added.

Usage Guidelines

Cisco 3550, 4000, and 4500 Series Switches

Use the **noswitchport**command to put the interface into the routed-interface status and to erase all Layer 2 configurations. You must use this command before assigning an IP address to a routed port. Entering the **noswitchport**command shuts down the port and then reenables it, which might generate messages on the device to which the port is connected.

You can verify the switchport status of an interface by entering the **showrunning-config** privileged EXEC command.

Cisco Catalyst 6500/6000 Series Switches and Cisco 7600 Series Routers

You must enter the **switchport** command without any keywords to configure the LAN interface as a Layer 2 interface before you can enter additional **switchport** commands with keywords. This action is required only if you have not entered the **switchport** command for the interface.

Entering the **noswitchport** command shuts down the port and then reenables it. This action may generate messages on the device to which the port is connected.

To optimize the port configuration, entering the **switchporthost** command sets the switch port mode to access, enables spanning tree PortFast, and disables channel grouping. Only an end station can accept this configuration.

Because spanning-tree PortFast is enabled, you should enter the **switchporthost** command only on ports that are connected to a single host. Connecting other Cisco 7600 series routers, hubs, concentrators, switches, and bridges to a fast-start port can cause temporary spanning-tree loops.

Enable the **switchporthost** command to decrease the time that it takes to start up packet forwarding.

The no form of the **switchport**nonegotiate command removes nonegotiate status.

When using the **nonegotiate** keyword, Dynamic Inter-Switch Link Protocol and Dynamic Trunking Protocol (DISL/DTP)-negotiation packets are not sent on the interface. The device trunks or does not trunk according to the mode parameter given: access or trunk. This command returns an error if you attempt to execute it in dynamic (auto or desirable) mode.

You must force a port to trunk before you can configure it as a SPAN-destination port. Use the **switchportnonegotiate** command to force the port to trunk.

Examples

Examples

The following example shows how to cause an interface to cease operating as a Layer 2 port and become a Cisco-routed (Layer 3) port:

```
Router(config-if)#
no switchport
```

Examples

The following example shows how to cause the port interface to stop operating as a Cisco-routed port and convert to a Layer 2-switched interface:

```
Router(config-if)#
switchport
Router(config-if)#
```

Note The **switchport** command is not used on platforms that do not support Cisco-routed ports. All physical ports on such platforms are assumed to be Layer 2-switched interfaces.

The following example shows how to optimize the port configuration for a host connection:

```
Router(config-if)# switchport host
switchport mode will be set to access
spanning-tree portfast will be enabled
channel group will be disabled
Router(config-if)#
```

This example shows how to cause a port interface that has already been configured as a switched interface to refrain from negotiating trunking mode and act as a trunk or access port (depending on the mode set):

```
Router(config-if)#
switchport nonegotiate
Router(config-if)#
```

The following example shows how to cause an interface to cease operating as a Cisco-routed port and to convert it into a Layer 2 switched interface:

```
Router(config-if)#
switchport
```

Note The **switchport** command is not used on platforms that do not support Cisco-routed (Layer 3) ports. All physical ports on such platforms are assumed to be Layer 2 switched interfaces.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching (nonrouting) port, including port blocking and port protection settings.

Command	Description
show running-config	Displays the current operating configuration.
switchport mode	Sets the interface type.
switchport trunk	Sets trunk characteristics when the interface is in trunking mode.

switchport access vlan

To set the VLAN when the interface is in access mode, use the **switchportaccessvlan**command in interface configuration mode. To reset the access-mode VLAN to the appropriate default VLAN for the device, use the **no** form of this command.

switchport access vlan *vlan-id*

no switchport access vlan

Syntax Description

vlan-id	VLAN to set when the interface is in access mode; valid values are from 1 to 4094.

Command Default

The defaults are as follows:

- Access VLAN and trunk-interface native VLAN are default VLANs that correspond to the platform or interface hardware.
- All VLAN lists include all VLANs.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

You must enter the **switchport** command without any keywords to configure the LAN interface as a Layer 2 interface before you can enter the **switchportaccessvlan**command. This action is required only if you have not entered the **switchport** command for the interface.

Entering the **noswitchport** command shuts down the port and then reenables it. This action may generate messages on the device to which the port is connected.

The no form of the **switchportaccessvlan** com mand resets the access-mode VLAN to the appropriate default VLAN for the device.

Examples

This example shows how to cause the port interface to stop operating as a Cisco-routed port and convert to a Layer 2 switched interface:

```
Router(config-if)#
switchport
```

Note The **switchport** command is not used on platforms that do not support Cisco-routed ports. All physical ports on such platforms are assumed to be Layer 2-switched interfaces.

This example shows how to cause a port interface that has already been configured as a switched interface to operate in VLAN 2 instead of the platform's default VLAN in the interface-configuration mode:

```
Router(config-if)#
switchport access vlan 2
```

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching (nonrouting) port.
switchport	Configures a LAN interface as a Layer 2 interface.

switchport autostate exclude

To exclude a port from the VLAN interface link-up calculation, use the **switchportautostateexclude**command in interface configuration mode. To return to the default settings, use the **no** form of this command.

switchport autostate exclude

no switchport autostate exclude

Syntax Description

This command has no keywords or arguments.

Command Default

All ports are included in the VLAN interface link-up calculation.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(17b)SXA	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command was introduced on the Supervisor Engine 2.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

You must enter the **switchport** command without any keywords to configure the LAN interface as a Layer 2 interface before you can enter the **switchportautostateexclude** command. This action is required only if you have not entered the **switchport** command for the interface.

Note The **switchport**command is not used on platforms that do not support Cisco-routed ports. All physical ports on such platforms are assumed to be Layer 2 switched interfaces.

A VLAN interface configured on the MSFC is considered up if there are ports forwarding in the associated VLAN. When all ports on a VLAN are down or blocking, the VLAN interface on the MSFC is considered down. For the VLAN interface to be considered up, all the ports in the VLAN need to be up and forwarding. You can enter the switchport autostate **exclude**command to exclude a port from the VLAN interface link-up calculation.

The switchport autostate **exclude** command marks the port to be excluded from the interface VLAN up calculation when there are multiple ports in the VLAN.

The **showinterface***interface***switchport** command displays the autostate mode if the mode has been set. If the mode has not been set, the autostate mode is not displayed.

Examples

This example shows how to exclude a port from the VLAN interface link-up calculation:

```
Router(config-if)#
switchport autostate exclude
```

This example shows how to include a port in the VLAN interface link-up calculation:

```
Router(config-if)#
no switchport autostate exclude
```

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching (nonrouting) port.
switchport	Configures a LAN interface as a Layer 2 interface.

switchport backup

To configure an interface as a Flexlink backup interface, use the **switchport backup** command in interface configuration mode. To disable this configuration, use the **no** form of this command.

switchport backup interface *type number*[**preemption** {**delay** *delay*| **mode** {**bandwidth**| **forced**| **off**}}]

no switchport backup [**interface** *type number* [**preemption** {**delay**| **mode**}]]

Syntax Description

interface *type number*	Specifies the interface type and the module and port number to be configured as a Flexlink backup interface.
preemption delay *delay*	Specifies the preemption delay in seconds. The range is from 0 to 300 seconds.
preemption mode bandwidth	Specifies that a higher bandwidth interface is preferred for preemption.
preemption mode forced	Specifies that an active interface is preferred for preemption.
preemption mode off	Specifies that preemption is turned off.

Command Default

Interfaces are not configured as Flexilink backup interfaces.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.2(18)SXF	This command was introduced on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.1(1)SY	This command was modified. The **no** form was modified so that specific backup configurations can be disabled.

Usage Guidelines

When you enable Flexlink, both the active and standby links are up physically, and mutual backup is provided.

Flexlink is supported on Layer 2 interfaces only and does not support routed ports.

The *number* arguement designates the module and port number. Valid values depend on the chassis and module that are used. For example, if you have a 48-port 10/100BASE-T Ethernet module that is installed in

a 13-slot chassis, valid values for the slot number are from 1 to 13, and valid values for the port number are from 1 to 48.

Flexlink is designed for simple access topologies (two uplinks from a leaf node). You must ensure that there are no loops from the wiring closet to the distribution/core network to enable Flexlink to perform correctly.

Flexlink converges faster for directly connected link failures. Flexlink fast convergence does not impact any other type of network failure.

You must enter the **switchport** command without any keywords to configure a LAN interface as a Layer 2 interface before you can enter the **switchport backup** command.

You can remove all Flexilink configurations on an interface by using the **no switchport backup** command. You can remove specific backup configurations by using the optional keywords in the **no** form of this command.

Note The **switchport** command is used only on platforms that support Cisco-routed ports. All physical ports on such platforms are assumed to be Layer 2 switched interfaces.

Examples

The following example shows how to enable Flexlink on an interface. This example also shows how to configure a preemption delay of 100 seconds on an interface.

```
Device(config)# interface GigabitEthernet1/1
Device(config-if)# switchport
Device(config-if)# switchport backup interface GigabitEthernet1/2
Device(config-if)# switchport backup interface GigabitEthernet1/2 preemption delay 100
Device(config-if)# end
Device# show running interface GigabitEthernet1/1

Building configuration...

Current configuration : 219 bytes
!
interface GigabitEthernet1/1
 switchport
 switchport backup interface Gi1/2
 switchport backup interface Gi1/2 preemption delay 100
end

Device# show interfaces switchport backup

Switch Backup Interface Pairs:

Active Interface        Backup Interface        State
------------------------------------------------------------------------
Gi1/1                   Gi1/2                   Active Up/Backup Down
```

The following example shows how to disable specific backup configurations on an interface:

```
Device(config)# interface GigabitEthernet1/1
Device(config-if)# no switchport backup interface GigabitEthernet1/2 preemption delay
Device(config-if)# end
Device# show running-config interface GigabitEthernet1/1

Building configuration...

Current configuration : 219 bytes
!
interface GigabitEthernet1/1
 switchport
 switchport backup interface Gi1/2
end
```

The following example shows how to disable Flexlink and remove all Flexlink configurations on an interface:

```
Device(config)# interface GigabitEthernet1/1
Device(config-if)# no switchport backup interface GigabitEthernet1/2
Device(config-if)# end
Device# show running-config interface GigabitEthernet1/1

Building configuration...

Current configuration : 219 bytes
!
interface GigabitEthernet1/1
 switchport
end
```

Related Commands

Command	Description
show interfaces switchport backup	Displays Flexlink pairs.
show running-config	Displays the contents of the current running configuration file or the configuration for a specific module, Layer 2 VLAN, class map, interface, map class, policy map, or VC class.
switchport	Configures a LAN interface as a Layer 2 interface.
switchport autostate exclude	Excludes a port from the VLAN interface link-up calculation.

switchport block unicast

To prevent the unknown unicast packets from being forwarded, use the **switchportblockunicast**command in interface configuration mode. To allow the unknown unicast packets to be forwarded, use the **no** form of this command.

switchport block unicast

no switchport block unicast

Syntax Description

This command has no arguments or keywords.

Command Default

The default settings are as follows:

- Unknown unicast traffic is not blocked.
- All traffic with unknown MAC addresses is sent to all ports.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(18)SXE	Support for this command was introduced on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

You can block the unknown unicast traffic on the switch ports.

Blocking the unknown unicast traffic is not automatically enabled on the switch ports; you must explicitly configure it.

Note For more information about blocking the packets, refer to the Cisco 7600 Series Router Cisco IOS Software Configuration Guide.

You can verify your setting by entering the **showinterfaces** *interface-id***switchport** command.

Examples

This example shows how to block the unknown unicast traffic on an interface:

```
Router(config-if)# switchport block unicast
```

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching (nonrouting) port.

switchport mode

To set the interface type, use the **switchport mode**command in interface configuration mode. Use the appropriate **no** form of this command to reset the mode to the appropriate default mode for the device.

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

switchport mode {**access**| **trunk**}

no switchport mode

Cisco Catalyst 6500/6000 Series Switches

switchport mode {**access**| **dot1q-tunnel**| **dynamic** {**auto**| **desirable**}| **trunk**}

no switchport mode

Cisco 7600 Series Routers

switchport mode {**access**| **dot1q-tunnel**| **dynamic** {**auto**| **desirable**}| **private-vlan**| **trunk**}

no switchport mode

switchport mode private-vlan {**host**| **promiscuous**}

no switchport mode private-vlan

Syntax Description

access	Sets a nontrunking, nontagged single VLAN Layer 2 interface.
trunk	Specifies a trunking VLAN Layer 2 interface.
dot1q-tunnel	Sets the trunking mode to TUNNEL unconditionally.
dynamic auto	Sets the interface to convert the link to a trunk link.
dynamic desirable	Sets the interface to actively attempt to convert the link to a trunk link.
private vlan host	Specifies that the ports with a valid private VLAN (PVLAN) association become active host private VLAN ports.
private vlan promiscuous	Specifies that the ports with a valid PVLAN mapping become active promiscuous ports.

Command Default

The default is **access** mode.

Command Default The default mode is dependent on the platform; it should be either **dynamicauto** for platforms that are intended as wiring closets or **dynamicdesirable** for platforms that are intended as backbone switches. The default for PVLAN ports is that no mode is set.

Command Default The defaults are as follows:

- The mode is dependent on the platform; it should either be **dynamicauto** for platforms that are intended for wiring closets or **dynamicdesirable** for platforms that are intended as backbone switches.
- No mode is set for PVLAN ports.

Command Modes Interface configuration

Command History

Release	Modification
12.0(7)XE	This command was introduced on the Cisco Catalyst 6000 family switches.
12.1(1)E	This command was integrated on the Cisco Catalyst 6000 family switches.
12.1(8a)EX	The switchport mode **private-vlan** {**host** | **promiscuous**} syntax was added.
12.2(2)XT	Creation of switchports became available on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T for creation of switchports on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Cisco IOS Release 12.2(17d)SXB.

Usage Guidelines

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

If you enter a forced mode, the interface does not negotiate the link to the neighboring interface. Ensure that the interface ends match.

The **no** form of the command is not supported on the Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.

Cisco Catalyst 6500/6000 Switches and Cisco 7600 Series Routers

If you enter **access** mode, the interface goes into permanent nontrunking mode and negotiates to convert the link into a nontrunk link even if the neighboring interface does not agree to the change.

If you enter **trunk** mode, the interface goes into permanent trunking mode and negotiates to convert the link into a trunk link even if the neighboring interface does not agree to the change.

If you enter **dynamicauto** mode, the interface converts the link to a trunk link if the neighboring interface is set to **trunk** or **desirable** mode.

If you enter **dynamicdesirable** mode, the interface becomes a trunk interface if the neighboring interface is set to **trunk**, **desirable**, or **auto** mode.

If you configure a port as a promiscuous or host-PVLAN port and one of the following applies, the port becomes inactive:

- The port does not have a valid PVLAN association or mapping configured.
- The port is a SPAN destination.

If you delete a private-port PVLAN association or mapping, or if you configure a private port as a SPAN destination, the deleted private-port PVLAN association or mapping or the private port that is configured as a SPAN destination becomes inactive.

If you enter **dot1q-tunnel** mode, PortFast Bridge Protocol Data Unit (BPDU) filtering is enabled and Cisco Discovery Protocol (CDP) is disabled on protocol-tunneled interfaces.

Examples

Examples

The following example shows how to set the interface to **access** desirable mode:

```
Router#configure terminal
Router(config)# interface fastethernet 4/1
Router(config-if)#switchport mode access
```

The following example shows how to set the interface to **trunk** mode:

```
Router#configure terminal
Router(config)# interface fastethernet 4/1
Router(config-if)#switchport mode trunk
```

Examples

The following example shows how to set the interface to dynamic desirable mode:

```
Router#configure terminal
Router(config)# interface fastethernet 4/1
Router(config-if)# switchport mode dynamic desirable
```

The following example shows how to set a port to PVLAN-host mode:

```
Router#configure terminal
Router(config)# interface fastethernet 4/1
Router(config-if)# switchport mode private-vlan host
```

The following example shows how to set a port to PVLAN-promiscuous mode:

```
Router#configure terminal
Router(config)# interface fastethernet 4/1
Router(config-if)# switchport mode private-vlan promiscuous
```

The following example shows how to configure tunneling on port 4/1 and verify the configuration:

```
Router#configure terminal
Router(config)# interface fastethernet 4/1
Router(config-if)# switchport mode dot1q-tunnel
Router(config-if)# end
```

Related Commands

Command	Description
show dot1q-tunnel	Displays a list of 802.1Q tunnel-enabled ports.
show interfaces switchport	Displays administrative and operational status of a switching (nonrouting) port.
show interfaces trunk	Displays trunk information.
switchport	Modifies the switching characteristics of the Layer 2-switched interface.
switchport private vlan host association	Defines a PVLAN association for an isolated or community port.
switchport private vlan mapping	Defines the PVLAN mapping for a promiscuous port.
switchport trunk	Sets trunk characteristics when the interface is in trunking mode.

switchport port-security

To enable port security on an interface, use the **switchportport-security** command in i nterface configuration mode . To disable port security, use the **no** form of this command.

switchport port-security

no switchport port-security

Syntax Description

This command has no keywords or arguments.

Command Default

D isabled

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(18)SXE	This command was changed as follows on the Supervisor Engine 720: • With Release 12.2(18)SXE and later releases, port security is supported on trunks. • With Release 12.2(18)SXE and later releases, port security is supported on 802.1Q tunnel ports.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Follow these guidelines when configuring port security:

- With Release 12.2(18)SXE and later releases, port security is supported on trunks.
- With releases earlier than Release 12.2(18)SXE, port security is not supported on trunks.
- With Release 12.2(18)SXE and later releases, port security is supported on 802.1Q tunnel ports.
- With releases earlier than Release 12.2(18)SXE, port security is not supported on 802.1Q tunnel ports.
- A secure port cannot be a destination port for a Switch Port Analyzer (SPAN).
- A secure port cannot belong to an EtherChannel.
- A secure port cannot be a trunk port.

- A secure port cannot be an 802.1X port. If you try to enable 802.1X on a secure port, an error message appears, and 802.1X is not enabled. If you try to change an 802.1X-enabled port to a secure port, an error message appears, and the security settings are not changed.

Examples

This example shows how to enable port security:

```
Router(config-if)#
switchport port-security
```

This example shows how to disable port security:

Related Commands

Command	Description
show port-security	Displays information about the port-security setting.

switchport port-security aging

To configure the port security aging , use the **switchport** port-security aging time command in interface configuration mode . To disable aging, use the **no** form of this command.

switchport port-security aging {**time** *time*| **type** {**absolute| inactivity**}}

no switchport port-security aging

Syntax Description

time *time*	Sets the duration for which all addresses are secured; valid values are from 1 to 1440 minutes.
type	Specifies the type of aging.
absolute	Specifies absolute aging; see the "Usage Guidelines" section for more information.
inactivity	Specifies that the timer starts to run only when there is no traffic; see the "Usage Guidelines" section for more information.

Command Default

The defaults are as follows:

- Disabled.
- If enabled, t he defaults are as follows:
  - *time* is 0.
  - **type** is **absolute**

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.

Release	Modification
12.2(18)SXE	This command was changed as follows on the Supervisor Engine 720: • With Release 12.2(18)SXE and later releases, port security is supported on trunks. • With Release 12.2(18)SXE and later releases, port security is supported on 802.1Q tunnel ports. • The **type**, **absolute**, and **inactivity** keywords were added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Follow these guidelines when configuring port security:

- With Release 12.2(18)SXE and later releases, port security is supported on trunks. With releases earlier than Release 12.2(18)SXE, port security is not supported on trunks.
- With Release 12.2(18)SXE and later releases, port security is supported on 802.1Q tunnel ports. With releases earlier than Release 12.2(18)SXE, port security is not supported on 802.1Q tunnel ports.

You can apply one of two types of aging for automatically learned addresses on a secure port:

- Absolute aging times out the MAC address after the age-time has been exceeded, regardless of the traffic pattern. This default is for any secured port, and the age-time is set to 0.
- Inactivity aging times out the MAC address only after the age_time of inactivity from the corresponding host has been exceeded.

Examples

This example shows how to set the aging time as 2 hours:

```
Router(config-if)# switchport port-security aging time 120
```

This example shows how to set the aging time as 2 minutes:

```
Router(config-if)# switchport port-security aging time 2
```

This example shows how to set the aging type on a port to absolute aging:

```
Router(config-if) switchport port-security aging type absolute
```

This example shows how to set the aging type on a port to inactivity aging:

```
Router(config-if) switchport port-security aging type
 inactivity
```

Related Commands

Command	Description
show port-security	Displays information about the port-security setting.

switchport private-vlan host-association

To define a PVLAN association for an isolated or community port, use the **switchportprivate-vlanhost-association**command in i nterface configuration mode . To remove the PVLAN mapping from the port, use the **no** form of this command.

switchport private-vlan host-association *primary-vlan-id secondary-vlan-id*

no switchport private-vlan host-association

Syntax Description

primary-vlan-id	Number of the primary VLAN of the PVLAN relationship; valid values are from 1 to 4094.
secondary-vlan-id	Number of the secondary VLAN of the private VLAN relationship; valid values are from 1 to 4094.

Command Default

No PVLAN is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to t Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

There is no run-time effect on the port unless it is in PVLAN-host mode. If the port is in PVLAN-host mode but neither of the VLANs exist, the command is allowed but the port is made inactive.

The secondary VLAN may be an isolated or community VLAN.

Examples

This example shows how to configure a port with a primary VLAN (VLAN 18) and secondary VLAN (VLAN 20):

```
Router(config-if)#
switchport private-vlan host-association 18 20
```

This example shows how to remove the PVLAN association from the port:

```
Router(config-if)#
no switchport private-vlan host-association
```

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching (nonrouting) port.
switchport mode	Displays the administrative and operational status of a switching (nonrouting) port.

switchport private-vlan mapping

To define the PVLAN mapping for a promiscuous port, use the **switchportprivate-vlanmapping** command in interface configuration mode. To clear all mappings from the primary VLAN, use the **no** form of this command.

{**switchport private-vlan mapping primary-vlan-id secondary-vlan-list**| **add secondary-vlan-list**| **remove secondary-vlan-list**}

no switchport private-vlan mapping

Syntax Description

primary-vlan-id	Number of the primary VLAN of the PVLAN relationship; valid values are from 1 to 4094.
secondary-vlan- list	Number of the secondary VLAN of the private VLAN relationship; valid values are from 1 to 4094.
add	Maps the secondary VLANs to the primary VLAN.
remove	Clears mapping between the secondary VLANs and the primary VLAN.

Command Default

No PVLAN mappings are configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

There is no run-time effect on the port unless it is in PVLAN-promiscuous mode. If the port is in PVLAN-promiscuous mode but the VLANs do not exist, the command is allowed but the port is made inactive.

The secondary VLAN may be an isolated or community VLAN.

Examples

This example shows how to configure the mapping of primary VLAN 18 to secondary isolated VLAN 20 on a port:

```
Router(config-if)#
switchport private-vlan mapping 18 20
```

This example shows how to add a VLAN to the mapping:

```
Router(config-if)#
switchport private-vlan mapping 18 add 21
```

This example shows how to remove the PVLAN mapping from the port:

```
Router(config-if)#
no switchport private-vlan mapping
```

Related Commands

Command	Description
show interfaces private-vlan mapping	Displays the information about the PVLAN mapping for VLAN SVIs.

switchport protected

Use the switch**portprotected**command to isolate unicast, multicast, and broadcast traffic at Layer 2 from other protected ports on the same switch in interface configuration mode. To disable protection on the port, use the **no** form of the command.

switchport protected

no switchport protected

Syntax Description

This command has no arguments or keywords.

Command Default

No protected port is defined. All ports are nonprotected.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.1(4)EA1	This command was first introduced.
12.4(15)T	This command was implemented on the following platforms: the Cisco 1841 Integrated Services Router (ISR), Cisco 2800 series ISRs, and Cisco 3800 series ISRs.

Usage Guidelines

The switchport protection feature is local to the switch; communication between protected ports on the same switch is possible only through a Layer 3 device. To prevent communication between protected ports on different switches, you must configure the protected ports for unique VLANs on each switch and configure a trunk link between the switches.

Beginning with Cisco IOS Release 12.4(15)T, the following Cisco ISRs support port protection when an appropriate high-speed WAN interface card (HWIC) is installed:

- Cisco 1841 ISR
- Cisco 2800 Series ISRs, including models 2801, 2811, 2821, and 2851
- Cisco 3800 Series ISRs, including models 3825 and 3845

To support port protection, the Cisco routers listed above must be equipped with one of the following HWICs:

- HWIC-4ESW
- HWIC-D-9ESW

Note Only the ports attached to the HWICs can be configured with port protection.

A protected port does not forward any unicast, multicast, or broadcast traffic to any other protected port. A protected port continues to forward unicast, multicast, and broadcast traffic to unprotected ports and vice versa.

Port monitoring does not work if both the monitor and monitored ports are protected ports.

A protected port is different from a secure port.

Examples

The following example shows how to enable a protected port on an interface:

```
Switch(config)# interface gigabitethernet0/3
Switch(config-if)# switchport protected
```

You can verify the previous command by entering the**showinterfacesswitchport**privileged EXEC command.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching (nonrouting) port, including port blocking and port protection settings.
switchport block	Prevents unknown multicast or unicast traffic on the interface.

switchport trunk

To set the trunk characteristics when the interface is in trunking mode, use the **switchporttrunk** command in interface configuration mode. To reset all of the trunking characteristics back to the original defaults, use the **no** form of this command.

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switchport trunk {**encapsulation dot1q**| **native vlan**| **allowed vlan**}

no switchport trunk {**encapsulation dot1q**| **native vlan**| **allowed vlan**}

Cisco 7600 Series Routers and Catalyst 6500 Series Switches

{**switchport trunk encapsulation** {**isl**| **dot1q** [**ethertype** *value*]| **negotiate**}| **native vlan** {**tag**| *vlan-id*}| **allowed vlan** *vlan-list*| **pruning vlan** *vlan-list*}

no switchport trunk {**encapsulation** {**isl**| **dot1q** [**ethertype** *value*]| **negotiate**}| **native vlan [tag]**| **allowed vlan**| **pruning vlan**}

Syntax Description

encapsulation isl	Sets the trunk encapsulation format to Inter-Switch Link (ISL).
encapsulation dot1q	Sets the trunk encapsulation format to 802.1Q.
native vlan	Sets the native VLAN for the trunk in 802.1Q trunking mode.
allowed vlan *vlan list*	Sets the list of allowed VLANs that transmit traffic from this interface in tagged format when in trunking mode.
ethertype *value*	(Optional) Sets the EtherType value; valid values are from 0x0 to 0x5EF-0xFFFF.
encapsulation negotiate	Specifies that if the Dynamic Inter-Switch Link (DISL) protocol and Dynamic Trunking Protocol (DTP) negotiation do not resolve the encapsulation format, ISL is the selected format.
native vlan tag	Enables the native VLAN tagging state on the interface.
native vlan *vlan id*	The particular native VLAN.
pruning vlan *vlan list*	Sets the list of VLANs that are enabled for VLAN Trunking Protocol (VTP) pruning when the interface is in trunking mode. See the “Usage Guidelines” section for the *vlanlist*argument formatting guidelines.

Command Default

- The default encapsulation type is dot1q.
- The default access VLAN and trunk interface native VLAN are default VLANs that correspond to the platform or interface hardware.
- The default for all VLAN lists is to include all VLANs.

Command Default

- The encapsulation type is dependent on the platform or interface hardware.
- The access VLAN and trunk interface native VLAN are default VLANs that correspond to the platform or interface hardware.
- The default for all VLAN lists is to include all VLANs.
- **ethertype** *value* for 802.1Q encapsulation is 0x8100.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
12.0(7)XE	This command was introduced on the Catalyst 6500 series switches.
12.1(1)E	Switchport creation on Catalyst 6500 series switches was added.
12.2(2)XT	This command was introduced to support switchport creation on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T to support switch port creation on Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
12.2(14)SX	This command was integrated into Cisco IOS Release 12.2(14)SX to support the Supervisor Engine 720 on the Cisco 7600 series routers and Catalyst 6500 series switches.
12.2(17a)SX	This command was modified to include the following: • Restriction of ISL trunk-encapsulation. • Addition of the **dot1q** keyword and **ethertype***value* keyword and argument.
12.2(17d)SXB	Support for the Supervisor Engine 2 on the Cisco 7600 series routers and Catalyst 6500 series switches was added.

Release	Modification
12.2(18)SXD	This command was modified to allow the **switchporttrunkallowedvlan**command to be entered on interfaces where the span destination port is either a trunk or an access port.
12.2(18)SXE	This command added a restriction that Gigabit Ethernet (GE) Optimized Layer 2 WAN ports are not supported on the Supervisor Engine 720.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(15)T	This command was modified to extend the range of valid VLAN IDs from 1 to 4094 for specified platforms.
12.2(33)SXH	This command was changed as follows: • Allowed the tagging of native VLAN traffic on a per-port basis. • Introduced on the Supervisor Engine 720-10GE.
12.2(33)SXI4	This command was modified to allow the **switchporttrunk** command to only be applied on the port channel (PO) itself.

Usage Guidelines

802.1Q Trunks

- When you connect Cisco switches through an 802.1Q trunk, make sure that the native VLAN for an 802.1Q trunk is the same on both ends of the trunk link. If the native VLAN on one end of the trunk is different from the native VLAN on the other end, spanning-tree loops might result.
- Disabling spanning tree on the native VLAN of an 802.1Q trunk without disabling spanning tree on every VLAN in the network can cause spanning-tree loops. Cisco recommends that you leave spanning tree enabled on the native VLAN of an 802.1Q trunk. If this is not possible, disable spanning tree on every VLAN in the network. Make sure that your network is free of physical loops before disabling spanning tree.
- When you connect two Cisco switches through 802.1Q trunks, the switches exchange spanning-tree bridge protocol data units (BPDUs) on each VLAN allowed on the trunks. The BPDUs on the native VLAN of the trunk are sent untagged to the reserved IEEE 802.1d spanning-tree multicast MAC address (01-80-C2-00-00-00). The BPDUs on all other VLANs on the trunk are sent tagged to the reserved Shared Spanning Tree Protocol (SSTP) multicast MAC address (01-00-0c-cc-cc-cd).
- The 802.1Q switches that are not Cisco switches maintain only a single instance of spanning-tree (Mono Spanning Tree [MST]) that defines the spanning-tree topology for all VLANs. When you connect a Cisco switch to a switch through an 802.1Q trunk without a Cisco switch, the MST of the switch and the native VLAN spanning tree of the Cisco switch combine to form a single spanning-tree topology known as the Common Spanning Tree (CST).
- Because Cisco switches transmit BPDUs to the SSTP multicast MAC address on VLANs other than the native VLAN of the trunk, switches that are not Cisco switches do not recognize these frames as BPDUs and flood them on all ports in the corresponding VLAN. Other Cisco switches connected to the 802.1Q cloud receive these flooded BPDUs. This condition allows Cisco switches to maintain a per-VLAN spanning-tree topology across a cloud of 802.1Q switches that are not Cisco switches. The 802.1Q cloud

of switches separating the Cisco switches is treated as a single broadcast segment among all switches connected to the 802.1Q cloud of switches that are not Cisco switches through 802.1Q trunks.

- Make sure that the native VLAN is the same on *all* of the 802.1Q trunks that connect the Cisco switches to the 802.1Q cloud of switches that are not Cisco switches.
- If you are connecting multiple Cisco switches to a 802.1Q cloud of switches that are not Cisco switches, all of the connections must be through 802.1Q trunks. You cannot connect Cisco switches to an 802.1Q cloud of switches that are not Cisco switches through ISL trunks or through access ports. Doing so will cause the switch to place the ISL trunk port or access port into the spanning-tree "port inconsistent" state and no traffic will pass through the port.

Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers

The**switchporttrunkencapsulation** command is supported only for platforms and interface hardware that can support 802.1Q formats.

The *vlanlist* format is **all** | **none** | **add** | **remove** | **except***vlanlist*[,*vlanlist*...] where:

- **all** --Specifies all VLANs from 1 to 1005. Beginning with Cisco IOS Release 12.4(15)T, the valid VLAN ID range is from 1 to 4094.
- **none** --Indicates an empty list. This keyword is not supported in the **switchporttrunkallowedvlan** form of the command.
- **add** --Adds the defined list of VLANs to those currently set instead of replacing the list.
- **remove** --Removes the defined list of VLANs from those currently set instead of replacing the list.
- **except** --Lists the VLANs that should be calculated by inverting the defined list of VLANs.
- *vlan list*-- Is either a single VLAN number from 1 to 1005 or a continuous range of VLANs described by two VLAN numbers, the lesser one first, separated by a hyphen that represents the VLAN IDs of the allowed VLANs when this port is in trunking mode. Beginning with Cisco IOS Release 12.4(15)T, the valid VLAN ID range is from 1 to 4094.

Cisco 7600 Series Routers and Catalyst 6500 Series Switches

This command is not supported on GE Layer 2 WAN ports.

You can enter the **switchporttrunk** command only on the PO. If you enter the **switchporttrunk** command on a port member the following message is displayed:

```
Configuration is not allowed on Port members. Remove the interface from the Port Channel
to modify its config
```

The **switchporttrunkencapsulationdot1q**command is supported only for platforms and interface hardware that can support both ISL and 802.1Q formats. Only 802.1Q encapsulation is supported by shared port adapters (SPAs).

If you enter the **switchporttrunkencapsulationisl** command on a port channel containing an interface that does not support ISL-trunk encapsulation, the command is rejected.

You can enter the **switchporttrunkallowedvlan** command on interfaces where the span destination port is either a trunk or an access port.

You can enter the **switchporttrunknativevlantag** command to enable the tagging of native VLAN traffic on a per-port basis. When tagging is enabled, all the packets on the native VLAN are tagged and all incoming untagged data packets are dropped, but untagged control packets are accepted. When tagging is disabled, the native VLAN packets going out on trunk ports are not tagged and the incoming untagged packets are allowed

and assigned to the native VLAN. The **noswitchporttrunknativevlantag** command overrides the **vlandot1qtagnative** command for global tagging.

Note The **switchporttrunknativevlantag** interface configuration mode command does not enable native VLAN tagging unless you first configure the switch to tag native VLAN traffic globally. To enable native VLAN tagging globally, use the **vlandot1qtagnative** command in global configuration mode.

Note The **switchporttrunkpruningvlan***vlan-list* command does not support extended-range VLANs; valid *vlan-list* values are from 1 to 1005.

The**dot1qethertype***value* keyword and argument are not supported on port-channel interfaces. You can enter the command on the individual port interface only. Also, you can configure the ports in a channel group to have different EtherType configurations.

Caution Be careful when configuring the custom EtherType value on a port. If you enter the **negotiate** keyword and DISL and Dynamic Trunking Protocol (DTP) negotiation do not resolve the encapsulation format, then ISL is the selected format and may pose as a security risk. The **no** form of this command resets the trunk-encapsulation format to the default.

- The **no** form of the **switchporttrunknativevlan** command resets the native mode VLAN to the appropriate default VLAN for the device.
- The **no** form of the **switchporttrunknativevlantag**command c onfigures the Layer 2 port not to tag native VLAN traffic.
- The **no** form of the **switchporttrunkallowedvlan** command resets the list to the default list, which allows all VLANs.
- The **no** form of the **switchporttrunkpruningvlan**command resets the list to the default list, which enables all VLANs for VTP pruning.
- The **no** form of the **switchporttrunkencapsulationdot1qethertype***value* command resets the list to the default value.

The *vlan-list* format is **all** | **none** | **add** | **remove** | **except** [*vlan-list*[**,***vlan-list*...]] where:

- **all** --Specifies all the appropriate VLANs. This keyword is not supported in the **switchporttrunkpruningvlan** command.
- **none** --Indicates an empty list. This keyword is not supported in the **switchporttrunkallowedvlan** command.
- **add** *vlan-list* **,** *vlan-list...*]-- Adds the defined list of VLANs to those currently set instead of replacing the list.
- **remove** *vlan-list* **,** *vlan-list...*]-- Removes the defined list of VLANs from those currently set instead of replacing the list. You can remove VLAN 1. If you remove VLAN 1 from a trunk, the trunk interface continues to send and receive management traffic (for example, Cisco Discovery Protocol, version 3; VTP; Port Aggregation Protocol, version 4 (PAgP4); and DTP) in VLAN 1.

Note You can remove any of the default VLANs (1002 to 1005) from a trunk; this action is not allowed in earlier releases.

- **except** *vlan-list* **,** *vlan-list...*] --Excludes the specified list of VLANs from those currently set instead of replacing the list.
- *vlan-list* **,** *vlan-list...* -- Specifies a single VLAN number from 1 to 4094 or a continuous range of VLANs that are described by two VLAN numbers from 1 to 4094. You can specify multiple VLAN numbers or ranges of numbers using a comma-separated list.

To specify a range of VLANs, enter the smaller VLAN number first, separated by a hyphen and the larger VLAN number at the end of the range.

Do not enable the reserved VLAN range (1006 to 1024) on trunks when connecting a Cisco 7600 series router running the Cisco IOS software on both the supervisor engine and the Multilayer Switch Feature Card (MSFC) to a Cisco 7600 series router running the Catalyst operating system. These VLANs are reserved in Cisco 7600 series routers running the Catalyst operating system. If enabled, Cisco 7600 series routers running the Catalyst operating system may disable the ports if a trunking channel is between these systems.

Examples

The following example shows how to cause a port interface configured as a switched interface to encapsulate in 802.1Q trunking format regardless of its default trunking format in trunking mode:

Router(config-if)# switchport trunk encapsulation dot1q

The following example shows how to configure the Layer 2 port to tag native VLAN traffic:

```
Router(config-if)#
switchport trunk native vlan tag
```

Related Commands

Command	Description
show interfaces switchport	Displays administrative and operational status of a switching (nonrouting) port.
vlan dot1q tag native	Enables dot1q tagging for all VLANs in a trunk.

switchport voice vlan

To configure a voice VLAN on a multiple-VLAN access port, use the **switchportvoicevlan** command in interface configuration mode. To remove the voice VLAN from the switch port, use the **no** form of the command.

switchport voice vlan {*vlan-id*| **dot1p**| **none**| **untagged**}

no switchport voice vlan

Syntax Description

vlan id	Voice VLAN identifier (VVID) of the VLAN used for voice traffic. Valid IDs are from 1 to 1005 (IDs 1006 to 4096 are not supported). Do not enter leading zeros. The switch port is an 802.1Q trunk port.
dot1p	The telephone uses priority tagging and uses VLAN 0. The switch port is an 802.1Q trunk port.
none	The telephone is not instructed through the command line interface (CLI) about the voice VLAN. The telephone uses its own configuration from the telephone keypad and transmits untagged voice traffic in the default VLAN.
untagged	The telephone does not tag frames; it uses VLAN 4095. The switch port can be an access port or an 802.1Q trunk port.

Command Default

The switch default is to not automatically configure the telephone (**none**).

The Cisco IP 7960 telephone default is to generate an 802.1Q/802.1P frame.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(2)XT	This command was introduced.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T to support creation of switchports .
12.2(14)SX	This command was integrated into Cisco IOS Release 12.2(14)SX and introduced on the Supervisor Engine 720.

Release	Modification
12.2(17d)SXB	This command was integrated into Cisco IOS Release 12.2(17d)SXB and introduced on the Supervisor Engine 2.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.

Usage Guidelines

This command does not create a voice VLAN. You can create a voice VLAN in VLAN-configuration mode by entering the **vlan(globalconfigurationmode)** command. If you configure both the native VLAN and the voice VLAN in the VLAN database and set the switch port to multiple-VLAN access mode, this command brings up the switch port as operational.

If you enter a voice VLAN identifier, the switch port sends CDP packets that configure the IP phone to transmit voice traffic in the voice VLAN in 802.1Q frames that are tagged with a Layer 2 CoS value . The default Layer 2 CoS is 5. The default Layer 3 IP-precedence value is 5.

If you enter dot1p, the switch port sends CDP packets that configure the IP phone to transmit voice traffic in the default VLAN in 802.1p frames that are tagged with a Layer 2 CoS value.

If you enter none, the switch port does not send CDP packets with VVID TLVs.

If you enter **untagged**, the switch port is enabled to receive untagged packets only.

Examples

This example shows how to create an operational multiple-VLAN access port with VLAN 101 as the voice VLAN:

```
Router(config-if)# switchport
Router(config-if)# switchport mode access
Router(config-if)# switchport access vlan 100
Router(config-if)# switchport voice vlan 101
Router(config-if)
```

This example shows how to change the multiple-VLAN access port to a normal access port:

```
Router(config-if)# interface fastethernet5/1
Router(config-if)# no switchport voice vlan
Router(config-if)
```

Related Commands

Command	Description
switchport access vlan	Sets the VLAN when the interface is in access mode.
switchport mode	Sets the interface type.

tunnel bandwidth through yellow

tunnel destination

To specify the destination for a tunnel interface, use the **tunnel destination** command in interface configuration mode. To remove the destination, use the **no** form of this command.

tunnel destination {*host-name*| *ip-address*| *ipv6-address*| **dynamic**}

no tunnel destination

Syntax Description

host-name	Name of the host destination.
ip-address	IP address of the host destination expressed in dotted decimal notation.
ipv6-address	IPv6 address of the host destination expressed in IPv6 address format.
dynamic	Applies the tunnel destination address dynamically to the tunnel interface.

Command Default

No tunnel interface destination is specified.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
10.0	This command was introduced.
12.3(7)T	This command was modified. The address field was modified to accept an *ipv6-address* argument to allow IPv6 nodes to be configured as a tunnel destination.
12.2(30)S	This command was integrated into Cisco IOS Release 12.2(30)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Release	Modification
Cisco IOS XE Release 2.1	This command was introduced on Cisco ASR 1000 Series Routers.
15.1SY	This command was integrated into Cisco IOS Release 15.1SY.
Cisco IOS XE Release 3.7S	This command was modified. The **dynamic** keyword was added.

Usage Guidelines

You cannot configure two tunnels to use the same encapsulation mode with exactly the same source and destination addresses. The workaround is to create a loopback interface and configure the packet source off of the loopback interface. Refer to the *Cisco IOS AppleTalk*, *ISO CLNS*, *and Novell IPX Configuration Guide* for more information about AppleTalk Cayman tunneling.

Examples

Examples

The following example shows how to configure the tunnel destination address for Cayman tunneling:

```
Device(config)# interface tunnel0
Device(config-if)# tunnel source ethernet0
Device(config-if)# tunnel destination 10.108.164.19
Device(config-if)# tunnel mode cayman
```

Examples

The following example shows how to set the tunnel destination address dynamically:

```
Device(config)# interface tunnel0
Device(config-if)# tunnel destination dynamic
Device(config-if)# *Nov 22 19:38:28.271: Tunnel notified destination change: dynamic is set
Device(config-if)# end
Device# show run interface tunnel0
Building configuration...

Current configuration : 63 bytes
!
interface Tunnel0
 no ip address
 tunnel source dynamic
 tunnel destination dynamic
end
```

If the tunnel destination address is configured to be set dynamically, you cannot configure the tunnel destination address without removing the dynamic configuration.

```
Device(config)# interface tunnel0
Device(config-if)# tunnel destination ethernet 0/0
Device(config-if)# end
Device# show run interface tunnel0
Building configuration...

Current configuration : 63 bytes
!
interface Tunnel0
 no ip address
 tunnel destination dynamic
end
Device# configure terminal
Device(config)# interface tunnel0
Device(config-if)# no tunnel destination
```

Examples

The following example shows how to configure the tunnel destination address for generic routing encapsulation (GRE) tunneling:

```
Device(config)# interface tunnel0
Device(config-if)# appletalk cable-range 4160-4160 4160.19
Device(config-if)# appletalk zone Engineering
Device(config-if)# tunnel source ethernet0
Device(config-if)# tunnel destination 10.108.164.19
Device(config-if)# tunnel mode gre ip
```

Examples

The following example shows how to configure the tunnel destination address for GRE tunneling of IPv6 packets:

```
Device(config)# interface Tunnel0
Device(config-if)# no ip address
Device(config-if)# ipv6 router isis
Device(config-if)# tunnel source Ethernet0/0
Device(config-if)# tunnel destination 2001:0DB8:1111:2222::1/64
Device(config-if)# tunnel mode gre ipv6
Device(config-if)# exit
!
Device(config)# interface Ethernet0/0
Device(config-if)# ip address 10.0.0.1 255.255.255.0
Device(config-if)# exit
!
Device(config)# ipv6 unicast-routing
Device(config)# router isis
Device(config)# net 49.0000.0000.000a.00
```

Related Commands

Command	Description
appletalk cable-range	Enables an extended AppleTalk network.
appletalk zone	Sets the zone name for the connected AppleTalk network.
tunnel mode	Sets the encapsulation mode for the tunnel interface.
tunnel source	Sets the source address of a tunnel interface.

tunnel mode

To set the encapsulation mode for the tunnel interface, use the **tunnelmode** command in interface configuration mode. To restore the default mode, use the no form of this command.

tunnel mode {**aurp**| **cayman**| **dvmrp**| **eon**| **gre**| **gre multipoint**| **gre ipv6**| **ipip [decapsulate-any]**| **ipsec ipv4**| **iptalk**| **ipv6**| **ipsec ipv6**| **mpls**| **nos**| **rbscp**}

no tunnel mode

Syntax Description

aurp	AppleTalk Update-Based Routing Protocol.
cayman	Cayman TunnelTalk AppleTalk encapsulation.
dvmrp	Distance Vector Multicast Routing Protocol.
eon	EON compatible Connectionless Network Protocol (CLNS) tunnel.
gre	Generic routing encapsulation (GRE) protocol. This is the default.
gre multipoint	Multipoint GRE (mGRE).
gre ipv6	GRE tunneling using IPv6 as the delivery protocol.
ipip	IP-over-IP encapsulation.
decapsulate-any	(Optional) Terminates any number of IP-in-IP tunnels at one tunnel interface. This tunnel will not carry any outbound traffic; however, any number of remote tunnel endpoints can use a tunnel configured this way as their destination.
ipsec ipv4	Tunnel mode is IPSec, and the transport is IPv4.
iptalk	Apple IPTalk encapsulation.
ipv6	Static tunnel interface configured to encapsulate IPv6 or IPv4 packets in IPv6.
ipsec ipv6	Tunnel mode is IPSec, and the transport is IPv6.
mpls	Multiprotocol Label Switching (MPLS) encapsulation.
nos	KA9Q/NOS compatible IP over IP.
rbscp	Rate Based Satellite Control Protocol (RBSCP).

Command Default The default is GRE tunneling.

Command Modes Interface configuration (config-if)

Command History

Release	Modification
10.0	This command was introduced.
10.3	The **aurp**, **dvmrp**, and **ipip** keywords were added.
11.2	The optional **decapsulate-any** keyword was added.
12.2(13)T	The **gremultipoint** keyword was added.
12.3(7)T	The following keywords were added: • **gre ipv6** to support GRE tunneling using IPv6 as the delivery protocol. • **ipv6** to allow a static tunnel interface to be configured to encapsulate IPv6 or IPv4 packets in IPv6. • **rbscp** to support RBSCP.
12.3(14)T	The **ipsecipv4** keyword was added.
12.2(18)SXE	The **gremultipoint** keyword added.
12.2(30)S	This command was integrated into Cisco IOS Release 12.2(30)S.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.4(4)T	The **ipsecipv6** keyword was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
Cisco IOS XE Release 2.1	This command was introduced on Cisco ASR 1000 Series Routers.
15.1SY	This command was integrated into Cisco IOS Release 15.1SY.

Usage Guidelines

Source and Destination Address

You cannot have two tunnels that use the same encapsulation mode with exactly the same source and destination address. The workaround is to create a loopback interface and source packets off of the loopback interface.

Cayman Tunneling

Designed by Cayman Systems, Cayman tunneling implements tunneling to enable Cisco routers to interoperate with Cayman GatorBoxes. With Cayman tunneling, you can establish tunnels between two routers or between a Cisco router and a GatorBox. When using Cayman tunneling, you must not configure the tunnel with an AppleTalk network address.

DVMRP

Use DVMRP when a router connects to an mrouted (multicast) router to run DVMRP over a tunnel. You must configure Protocol Independent Multicast (PIM) and an IP address on a DVMRP tunnel.

GRE with AppleTalk

GRE tunneling can be done between Cisco routers only. When using GRE tunneling for AppleTalk, you configure the tunnel with an AppleTalk network address. Using the AppleTalk network address, you can ping the other end of the tunnel to check the connection.

Multipoint GRE

After enabling mGRE tunneling, you can enable the **tunnelprotection** command, which allows you to associate the mGRE tunnel with an IPSec profile. Combining mGRE tunnels and IPSec encryption allows a single mGRE interface to support multiple IPSec tunnels, thereby simplifying the size and complexity of the configuration.

Note GRE tunnel keepalives configured using the **keepalive** command under a GRE interface are supported only on point-to-point GRE tunnels.

RBSCP

RBSCP tunneling is designed for wireless or long-distance delay links with high error rates, such as satellite links. Using tunnels, RBSCP can improve the performance of certain IP protocols, such as TCP and IPSec, over satellite links without breaking the end-to-end model.

IPSec in IPv6 Transport

IPv6 IPSec encapsulation provides site-to-site IPSec protection of IPv6 unicast and multicast traffic. This feature allows IPv6 routers to work as a security gateway, establishes IPSec tunnels between another security gateway router, and provides crypto IPSec protection for traffic from an internal network when being transmitting across the public IPv6 Internet. IPv6 IPSec is very similar to the security gateway model using IPv4 IPsec protection.

Examples

Examples

The following example shows how to enable Cayman tunneling:

```
Router(config
)
# interface tunnel 0
Router(config-if)# tunnel source ethernet 0
Router(config-if)# tunnel destination 10.108.164.19
Router(config-if)# tunnel mode cayman
```

Examples

The following example shows how to enable GRE tunneling:

```
Router(config
)
# interface tunnel 0
```

```
Router(config-if)# appletalk cable-range 4160-4160 4160.19
Router(config-if)# appletalk zone Engineering
Router(config-if)# tunnel source ethernet0
Router(config-if)# tunnel destination 10.108.164.19
Router(config-if)# tunnel mode gre
```

Examples The following example shows how to configure a tunnel using IPSec encapsulation with IPv4 as the transport mechanism:

Router(config)# **cryptoipsecprofilePROF**

Router(config) #**settransformtset**

Router(config) #**interfaceTunnel0**

Router(config -if) #**ipaddress10.1.1.1255.255.255.0**

Router(config -if) #**tunnelmodeipsecipv4**

Router(config -if) #**tunnelsourceLoopback0**

Router(config -if) #**tunneldestination172.16.1.1**

```
Router(config-if)# tunnel protection ipsec profile PROF
```

Examples The following example shows how to configure an IPv6 IPSec tunnel interface:

```
Router(config)# interface tunnel 0
Router(config-if)# ipv6 address 2001:0DB8:1111:2222::2/64
Router(config-if)# tunnel destination 10.0.0.1
Router(config-if)# tunnel source Ethernet 0/0
Router(config-if)# tunnel mode ipsec ipv6

Router(config-if)# tunnel protection ipsec profile profile1
```

Examples The following example shows how to enable mGRE tunneling:

```
interface Tunnel0
 bandwidth 1000
 ip address 10.0.0.1 255.255.255.0
! Ensures longer packets are fragmented before they are encrypted; otherwise, the ! receiving
 router would have to do the reassembly.
 ip mtu 1416
! Turns off split horizon on the mGRE tunnel interface; otherwise, EIGRP will not ! advertise
 routes that are learned via the mGRE interface back out that interface.
 no ip split-horizon eigrp 1
 no ip next-hop-self eigrp 1
 delay 1000
! Sets IPSec peer address to Ethernet interface's public address.
 tunnel source Ethernet0
 tunnel mode gre multipoint
! The following line must match on all nodes that want to use this mGRE tunnel.
 tunnel key 100000
 tunnel protection ipsec profile vpnprof
```

Examples The following example shows how to enable RBSCP tunneling:

```
Router(config
)
# interface tunnel 0
Router(config-if)# tunnel source ethernet 0
```

```
Router(config-if)# tunnel destination 10.108.164.19
Router(config-if)# tunnel mode rbscp
```

Related Commands

Command	Description
appletalk cable-range	Enables an extended AppleTalk network.
appletalk zone	Sets the zone name for the connected AppleTalk network.
tunnel destination	Specifies the destination for a tunnel interface.
tunnel protection	Associates a tunnel interface with an IPSec profile.
tunnel source	Sets the source address of a tunnel interface.

tunnel source

To set the source address for a tunnel interface, use the **tunnel source** command in interface configuration mode. To remove the source address, use the **no** form of this command.

tunnel source {*ip-address*| *ipv6-address*| *interface-type interface-number*| **dynamic**}

no tunnel source

Syntax Description

dynamic	Applies the tunnel source address dynamically to the tunnel interface.
ip-address	Source IP address of packets in the tunnel. • In case of traffic engineering (TE) tunnels, the control packets are affected.
ipv6-address	Source IPv6 address of packets in the tunnel.
interface-type	Interface type.
interface-number	Port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system and can be displayed with the **show interfaces** command.

Command Default

No tunnel interface source address is set.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
10.0	This command was introduced.
12.3(7)T	The address field has been updated to accept an IPv6 address as the source address allowing an IPv6 node to be used as a tunnel source.
12.2(30)S	This command was integrated into Cisco IOS Release 12.2(30)S.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Release	Modification
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS Release 2.1 and implemented on Cisco ASR 1000 Series Aggregation Services Routers.
15.1SY	This command was integrated into Cisco IOS Release 15.1SY.
Cisco IOS XE Release 3.7S	This command was modified. The **dynamic** keyword was added.

Usage Guidelines

The source address is either an explicitly defined IP address or the IP address assigned to the specified interface.

You cannot have two tunnels using the same encapsulation mode with exactly the same source and destination addresses. The workaround is to create a loopback interface and source packets from the loopback interface. This restriction is applicable only for generic routing encapsulation (GRE) tunnels. You can have more than one TE tunnel with the same source and destination addresses.

When using tunnels to Cayman boxes, you must set the **tunnel source** command to an explicit IP address on the same subnet as the Cayman box, and not the tunnel itself.

GRE tunnel encapsulation and deencapsulation for multicast packets are handled by the hardware. Each hardware-assisted tunnel must have a unique source. Hardware-assisted tunnels cannot share a source even if the destinations are different. You should use secondary addresses on loopback interfaces or create multiple loopback interfaces to ensure that the hardware-assisted tunnels do not share a source.

Examples

Examples

The following example shows how to set a tunnel source address for Cayman tunneling:

```
Device(config)# interface tunnel0
Device(config-if)# tunnel source ethernet0
Device(config-if)# tunnel destination 172.32.164.19
Device(config-if)# tunnel mode cisco1
```

Examples

The following example shows how to set the tunnel source dynamically:

```
Device(config)# interface tunnel0
Device(config-if)# tunnel source dynamic
Device(config-if)# *Nov 22 19:38:28.271: Tunnel notified source change: dynamic is set
Device(config-if)# end
Device# show run interface tunnel0
Building configuration...

Current configuration : 63 bytes
!
interface Tunnel0
 no ip address
 tunnel source dynamic
end
```

If the tunnel source is configured to be set dynamically, you cannot configure the tunnel source address without removing the dynamic configuration.

```
Device(config)# interface tunnel0
Device(config-if)# tunnel source ethernet 0/0
Device(config-if)# *Nov 22 21:39:52.423: Tunnel notified source change: dynamic is set
*Nov 22 21:39:52.423: Tunnel notified source change, src ip 1.1.1.1
Device(config-if)# end
Device# show run interface tunnel0
Building configuration...

Current configuration : 63 bytes
!
interface Tunnel0
 no ip address
 tunnel source dynamic
end
Device# configure terminal
Device(config)# interface tunnel0
Device(config-if)# no tunnel source
Device(config-if)# *Nov 22 21:41:10.287: Tunnel notified source change: dynamic is not set
```

Examples

The following example shows how to set a tunnel source address for GRE tunneling:

```
Device(config)# interface tunnel0
Device(config-if)# appletalk cable-range 4160-4160 4160.19
Device(config-if)# appletalk zone Engineering
Device(config-if)# tunnel source ethernet0
Device(config-if)# tunnel destination 172.32.164.19
Device(config-if)# tunnel mode gre ip
```

Examples

The following example shows how to set a tunnel source for a Multiprotocol Label Switching (MPLS) TE tunnel:

```
Device> enable
Device# configure terminal
Device(config)# interface tunnel 1
Device(config-if)# ip unnumbered loopback0
Device(config-if)# tunnel source loopback1
Device(config-if)# tunnel mode mpls traffic-eng
Device(config-if)# end
```

Related Commands

Command	Description
appletalk cable-range	Enables an extended AppleTalk network.
appletalk zone	Sets the zone name for the connected AppleTalk network.
tunnel destination	Specifies the destination for a tunnel interface.