



CHAPTER 8

Configuring Interfaces

This chapter describes how to configure interfaces for the Catalyst 4500 series of standalone and modular switches. It also provides guidelines, procedures, and configuration examples.

This chapter includes the following major sections:

- [Restrictions for Configuring Interfaces, page 8-2](#)
- [About Interface Configuration, page 8-2](#)
- [Using the interface Command, page 8-2](#)
- [Configuring a Range of Interfaces, page 8-4](#)
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- [Defining and Using Interface-Range Macros, page 8-11](#)
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- [Online Insertion and Removal on a WS-4500X-32, page 8-44](#)
- [Monitoring and Maintaining the Interface, page 8-46](#)



Note

For complete syntax and usage information for the switch commands used in this chapter, see the *Cisco Catalyst 4500 Series Switch Command Reference* and related publications at this location:
<http://www.cisco.com/en/US/products/hw/switches/ps4324/index.html>

If a command is not in the *Catalyst 4500 Series Switch Command Reference*, you can locate it in the Cisco IOS library. See related publications at this location:
<http://www.cisco.com/en/US/products/ps6350/index.html>

Restrictions for Configuring Interfaces

The following restriction is applicable for configuring interface:

- On a Cisco Catalyst 4500E Series Switches with Supervisor Engine 8-E, the management interface receive counter value is unreliable due to deficient functionality in the underlying CPU chip hardware. Fixing this issue requires a new revision of the CPU (when available).

About Interface Configuration

By default, all interfaces are enabled. The 10/100-Mbps Ethernet interfaces autonegotiate connection speed and duplex. The 10/100/1000-Mbps Ethernet interfaces negotiate speed, duplex, and flow control. The 1000-Mbps Ethernet interfaces negotiate flow control only. Autonegotiation automatically selects the fastest speed possible on that port for the given pair. If a speed is explicitly stated for an interface, that interface defaults to half duplex unless it is explicitly set for full duplex.

Many features are enabled on a per-interface basis. When you enter the **interface** command, you must specify the following:

- Interface type:
 - Fast Ethernet (use the **fastethernet** keyword)
 - Gigabit Ethernet (use the **gigabitethernet** keyword)
 - 10-Gigabit Ethernet (use the **tengigabitethernet** keyword)
- Slot number—The slot in which the interface module is installed. Slots are numbered starting with 1, from top to bottom.
- Interface number—The interface number on the module. The interface numbers always begin with 1. When you are facing the front of the switch, the interfaces are numbered from left to right.

You can identify interfaces by physically checking the slot/interface location on the switch. You can also use the Cisco IOS **show** commands to display information about a specific interface or all the interfaces.

Using the interface Command

These general instructions apply to all interface configuration processes:

-
- Step 1** At the privileged EXEC prompt, enter the **configure terminal** command to enter global configuration mode:
- ```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
```
- Step 2** In global configuration mode, enter the **interface** command. Identify the interface type and the number of the connector on the interface card. The following example shows how to select Fast Ethernet, slot 5, interface 1:

```
Switch(config)# interface fastethernet 5/1
Switch(config-if)#
```

- Step 3** Interface numbers are assigned at the factory at the time of installation or when modules are added to a system. Enter the **show interfaces EXEC** command to see a list of all interfaces installed on your switch. A report is provided for each interface that your switch supports, as shown in this display:

```
Switch(config-if)#Ctrl-Z
Switch#show interfaces
Vlan1 is up, line protocol is down
 Hardware is Ethernet SVI, address is 0004.dd46.7aff (bia 0004.dd46.7aff)
 MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
 reliability 255/255, txload 1/255, rxload 1/255
 Encapsulation ARPA, loopback not set
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input never, 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
 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 packets output, 0 bytes, 0 underruns
 0 output errors, 0 interface resets
 0 output buffer failures, 0 output buffers swapped out
GigabitEthernet1/1 is up, line protocol is down
 Hardware is Gigabit Ethernet Port, address is 0004.dd46.7700 (bia 0004.dd46.7700)
 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)
 Auto-duplex, Auto-speed
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input never, output never, output hang never
 Last clearing of "show interface" counters never
 Input queue: 0/2000/0/0 (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 runts, 0 giants, 0 throttles
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
 0 input packets with dribble condition detected
 0 packets output, 0 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
GigabitEthernet1/2 is up, line protocol is down
 Hardware is Gigabit Ethernet Port, address is 0004.dd46.7701 (bia 0004.dd46.7701)
 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)
 Auto-duplex, Auto-speed
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input never, output never, output hang never
 Last clearing of "show interface" counters never
 Input queue: 0/2000/0/0 (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 runts, 0 giants, 0 throttles
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
 0 input packets with dribble condition detected
 0 packets output, 0 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
--More--
<...output truncated...>

```

- Step 4** To begin configuring Fast Ethernet interface 5/5, as shown in the following example, enter the **interface** keyword, interface type, slot number, and interface number in global configuration mode:

```

Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet 5/5
Switch(config-if)#

```



**Note** You do not need to add a space between the interface type and interface number. For example, in the preceding line you can specify either fastethernet 5/5 or fastethernet5/5.

- Step 5** Follow each **interface** command with the interface configuration commands your particular interface requires. The commands you enter define the protocols and applications that run on the interface. The commands are collected and applied to the **interface** command until you enter another **interface** command or press **Ctrl-Z** to exit interface configuration mode and return to privileged EXEC mode.
- Step 6** After you configure an interface, check its status by using the EXEC **show** commands listed in the [“Monitoring and Maintaining the Interface”](#) section on page 8-46.



**Note** Carrier-delay timer modification is not supported on Cisco Catalyst 4500 series switch. A default two second timer is applicable for interface transitions.

## Configuring a Range of Interfaces

The interface-range configuration mode allows you to configure multiple interfaces with the same configuration parameters. When you enter the interface-range configuration mode, all command parameters you enter are attributed to all interfaces within that range until you exit interface-range configuration mode.

To configure a range of interfaces with the same configuration, enter this command:

| Command                                                                                                                                                                                                                                                                                                        | Purpose                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>Switch(config)# interface range {vlan vlan_ID - vlan_ID}   {{fastethernet   gigabitethernet   tengigabitethernet   macro macro_name} slot/interface - interface} [, {vlan vlan_ID - vlan_ID} {{fastethernet   gigabitethernet   tengigabitethernet   macro macro_name} slot/interface - interface}]</pre> | <p>Selects the range of interfaces to be configured. Note the following:</p> <ul style="list-style-type: none"> <li>You are required to enter a space before the dash.</li> <li>You can enter up to five comma-separated ranges.</li> <li>You are not required to enter spaces before or after the comma.</li> </ul> |

**Note**

When you use the **interface range** command, you must add a space between the **vlan**, **fastethernet**, **gigabitethernet**, **tengigabitethernet**, or **macro** keyword and the dash. For example, the command **interface range fastethernet 5/1 - 5** specifies a valid range; the command **interface range fastethernet 5/1-5** does not contain a valid range command.

**Note**

The **interface range** command works only with VLAN interfaces that have been configured with the **interface vlan** command (the **show running-configuration** command displays the configured VLAN interfaces). VLAN interfaces that are not displayed by the **show running-configuration** command cannot be used with the **interface range** command.

This example shows how to reenoble all Fast Ethernet interfaces 5/1 to 5/5:

```
Switch(config)# interface range fastethernet 5/1 - 5
Switch(config-if-range)# no shutdown
Switch(config-if-range)#
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/1, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/2, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/3, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/4, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet5/5, changed state to up
*Oct 6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/
5, changed state to up
*Oct 6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/
3, changed state to up
*Oct 6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/
4, changed state to up
Switch(config-if)#
```

This example shows how to use a comma to add different interface type strings to the range to reenoble all Fast Ethernet interfaces ranging from 5/1 to 5/5 and both Gigabit Ethernet interfaces 1/1 and 1/2:

```
Switch(config-if)# interface range fastethernet 5/1 - 5, gigabitethernet 1/1 - 2
Switch(config-if)# no shutdown
Switch(config-if)#
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet5/1, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet5/2, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet5/3, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet5/4, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet5/5, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface GigabitEthernet1/1, changed state to
up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface GigabitEthernet1/2, changed state to
up
```

```
*Oct 6 08:29:29: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/
5, changed state to up
*Oct 6 08:29:29: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/
3, changed state to up
*Oct 6 08:29:29: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet5/
4, changed state to up
Switch(config-if)#
```

**Note**

If you enter multiple configuration commands while in interface-range configuration mode, each command is run as it is entered (they are not batched together and run after you exit interface-range configuration mode). If you exit interface-range configuration mode while the commands are being run, some commands might not be run on all interfaces in the range. Wait until the command prompt is displayed before exiting interface-range configuration mode.

## Using the Ethernet Management Port

This section has this information:

- [Understanding the Ethernet Management Port, page 8-6](#)
- [Supported Features on the Ethernet Management Port, page 8-10](#)
- [Configuring the Ethernet Management Port, page 8-11](#)

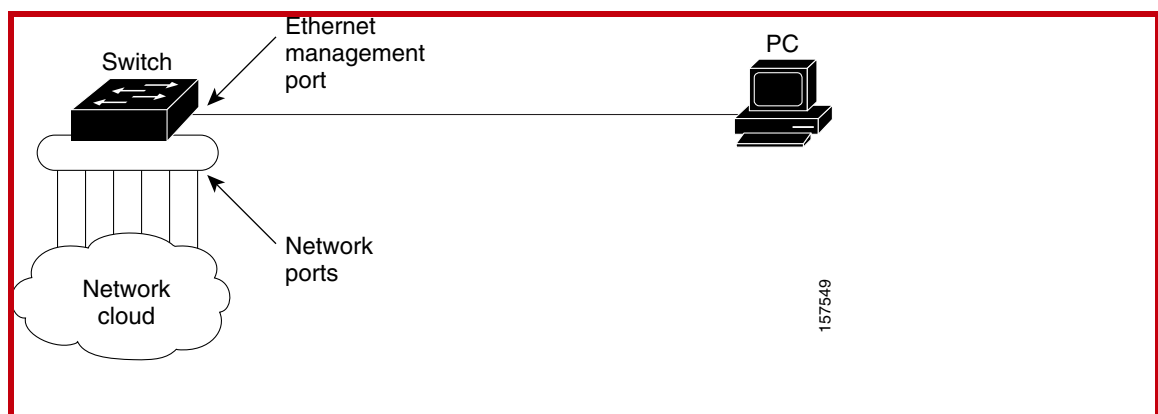
## Understanding the Ethernet Management Port

The Ethernet management port, also referred to as the *Fal* or *fastethernet1* port, is a Layer 3 host port to which you can connect a PC. Use the Ethernet management port instead of the switch console port for network management. When managing a switch, connect the PC to the Ethernet management port on a Catalyst 4500 series switch. (Figure 8-1).

**Note**

When connecting a PC to the Ethernet management port, you must assign an IP address.

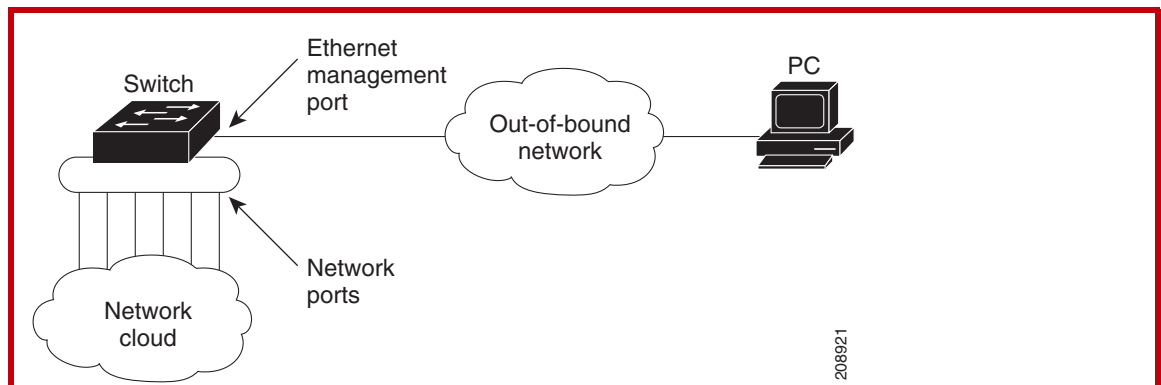
**Figure 8-1** Connecting a Switch to a PC



By default, the Ethernet management port is enabled. The switch cannot route packets from the Ethernet management port to a network port, and from the network port to the Ethernet port. To obtain these, the Fa1 interface is automatically placed in a separate routing domain (or VRF domain), called *mgmtVrf*. (You observe the *ip Vrf forwarding mgmtVrf* line in the running configuration when you boot up.) For details, read the “Fa1 Interface and mgmtVrf” section on page 8-7.

Even though the Ethernet management port does not support routing, you might need to enable routing protocols on the port. As illustrated in Figure 8-2, you must enable routing protocols on the Ethernet management port when the PC is multiple hops away from the switch and the packets must pass through multiple Layer 3 devices to reach the PC.

**Figure 8-2 Network with Routing Protocols Enabled**



The specific implementation of Ethernet management port depends on the redundancy model you are applying.

For details on configuring SSO and ISSU, refer to Chapter 10, “Configuring Supervisor Engine Redundancy Using RPR and SSO on Supervisor Engine 6-E and Supervisor Engine 6L-E” and Chapter 8, “Configuring Interfaces”.

Sections include:

- [Fa1 Interface and mgmtVrf](#), page 8-7
- [SSO Model](#), page 8-10
- [ISSU Model](#), page 8-10

## Fa1 Interface and mgmtVrf



### Caution

The Ethernet management port is intended for out-of-band access only. Like the console port, the Ethernet management port has direct access to critical resources on the switch. Connecting this port to an in-band network might cause performance degradation and vulnerability to a denial of service attack.



### Note

A service-policy that is applied to the control-plane interface is not applicable to traffic incoming on the management port.

All features that use fa1 now need to be VRF-aware.

**Note**

You cannot configure any other interface in the same routing domain and you cannot configure a different routing domain for the Fa1 interface.

On bootup the fa1 port assumes the following default configuration.

Images prior to Cisco IOS XE 3.4.0SG/15.1(2)SG use the old VRF definition format for management VRF as shown below.

```
!
ip vrf mgmtVrf
!
interface FastEthernet1
ip vrf forwarding mgmtVrf
speed auto
duplex auto
!
```

Images starting from Cisco IOS XE 3.4.0SG/15.1(2)SG use the new VRF definition format for management VRF as shown below.

```
!
vrf definition mgmtVrf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
interface FastEthernet1
vrf forwarding mgmtVrf
speed auto
duplex auto
!
```

Switch# **show ip vrf**

| Name    | Default RD | Interfaces |
|---------|------------|------------|
| mgmtVrf |            | Fa1        |

Because the management port is placed in mgmtVrf, you should be aware of the VRF aware commands required for the following tasks:

- [Ping, page 8-8](#)
- [TraceRoute, page 8-9](#)
- [Telnet, page 8-9](#)
- [TFTP, page 8-9](#)
- [FTP, page 8-9](#)
- [SSH, page 8-9](#)

**Note**

Command usage specific to the mgmtVrf are mentioned below. The additional configuration that is necessary to make the feature work needs to be configured.

**Ping**

If you want to ping an IP address that is reachable through an fa1 port, enter the following command:



```
Switch# ping vrf mgmtVrf ip address
```

For example:

```
Switch# ping vrf mgmtVrf 20.20.20.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 20.20.20.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

## TraceRoute

```
Switch# traceroute vrf mgmtVrf ip address
```

For example:

```
Eg: Switch# traceroute vrf mgmtVrf 20.20.20.1
Type escape sequence to abort.
Tracing the route to 20.20.20.1
 0 20.20.20.1 0 msec 0 msec *
```

## Telnet

If you want to Telnet to a remote switch through the Fa1 port, enter the following command:

```
Switch# telnet word /vrf mgmtVrf
word IP address or hostname of a remote system
```

Following is an example illustrating how to use this command:

```
Switch# telnet 20.20.20.1 /vrf mgmtVrf
Trying 20.20.20.1 ... Open
User Access Verification
Password:
switch> en
Password:
switch#
```

## TFTP

If you want to use Fa1 port for TFTP operation, configure the Fa1 port as the source interface for TFTP as follows:

```
Switch(config)# ip tftp source-interface fastEthernet1
```

## FTP

If you want to use an Fa1 port for an FTP operation, configure the Fa1 port as the source interface for FTP as follows:

```
Switch(config)# ip ftp source-interface fastEthernet1
```

## SSH

If you want to initiate SSH from your switch through the Fa1 port, enter the following command:

```
Switch# ssh -l login name -vrf mgmtVrf ip address
```

For example:

```
Switch# ssh -l xyz -vrf mgmtVrf 20.20.20.1
```

## SSO Model

On a redundant chassis, management port behavior differs from that of a standard Ethernet port in that each supervisor engine possesses a management port, and only the port on the active supervisor engine is enabled. The management port on the standby supervisor engine is always disabled; it cannot switch any kind of traffic.

When a switchover occurs, the management port of the standby supervisor engine (now, active) is enabled and can be used to switch traffic, while the management port on the “old” active supervisor engine is disabled.



### Note

The Cisco IOS configuration for the management port is synchronized between the two supervisor engines. Under Cisco IOS, they possess the same IP address. To avoid address overlapping during a switchover on a redundant chassis, you should assign a different IP address on the management port from the one you assigned to the same port in the ROMMON configuration.

## ISSU Model

In SSO mode, the running configurations on the active and standby supervisor engines must match. You cannot enable the management port on a redundant chassis if one of the two supervisor engines is running a Cisco IOS image prior to Cisco IOS Release 12.2(50)SG (wherein a management port is not supported).

When you perform an ISSU upgrade or downgrade between Cisco IOS Release 12.2(50)SG and a software image prior to Cisco IOS Release 12.2(50)SG, we automatically disable the management port. The port configuration is restored when both software images running on the supervisor engines are at least Cisco IOS Release 12.2(50)SG. A warning message is also displayed.

## Supported Features on the Ethernet Management Port

The Ethernet management port supports these features:

- Express setup
- Network Assistant
- Telnet with passwords
- TFTP
- Secure Shell (SSH)
- DHCP-based autoconfiguration
- SNMP (only the ENTITY-MIB and the IF-MIB)
- IP ping
- Interface features
  - Speed—10 Mb/s, 100 Mb/s, 1000Mb/s, and autonegotiation
  - Duplex mode—Full, half, and autonegotiation
  - Loopback detection
- Cisco Discovery Protocol (CDP) (only on WS-C4900M and WS-C4948)

- IPv4 access control lists (ACLs)
- Routing protocols (only on WS-C4900M and WS-C4948)
- AAA

**Caution**

Before enabling a feature on the Ethernet management port, ensure that the feature is supported. If you try to configure an unsupported feature on an Ethernet management port, the feature might not work properly, and the switch might fail.

## Configuring the Ethernet Management Port

To specify the Ethernet management port, enter **fastethernet1**.

To disable the port, use the **shutdown** interface configuration command. To enable the port, use the **no shutdown** interface configuration command.

To determine the link status to the PC, you can monitor the LED for the Ethernet management port:

- The LED is green (on) when the link is active.
- The LED is off when the link is down, or when the ports are deactivated.
- The LED is amber when there is a POST failure.

To display the link status, use the **show interfaces fastethernet 1** privileged EXEC command.

## Defining and Using Interface-Range Macros

You can define an interface-range macro to automatically select a range of interfaces for configuration. Before using the **macro** keyword in the **interface-range** macro command string, you must define the macro.

To define an interface-range macro, enter this command:

This example shows how to define an interface-range macro named **enet\_list** to select Fast Ethernet

| Command                                                                                                                                                                                                                                                                                    | Purpose                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <pre>Switch(config)# define interface-range macro_name {vlan vlan_ID - vlan_ID}   {{fastethernet   gigabitethernet   tengigabitethernet} slot/interface - interface} [, {vlan vlan_ID - vlan_ID} {{fastethernet   gigabitethernet   tengigabitethernet} slot/interface - interface}]</pre> | <p>Defines the interface-range macro and saves it in the running configuration file.</p> |

interfaces 5/1 through 5/4:

```
Switch(config)# define interface-range enet_list fastethernet 5/1 - 4
```

To show the defined interface-range macro configuration, enter this command:

| Command                            | Purpose                                                |
|------------------------------------|--------------------------------------------------------|
| Switch# <b>show running-config</b> | Shows the defined interface-range macro configuration. |

This example shows how to display the defined interface-range macro named **enet\_list**:

```
Switch# show running-config | include define
define interface-range enet_list FastEthernet5/1 - 4
Switch#
```

To use an interface-range macro in the **interface range** command, enter this command:

| Command                                                     | Purpose                                                                                               |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Switch(config)# <b>interface range macro</b><br><i>name</i> | Selects the interface range to be configured using the values saved in a named interface-range macro. |

This example shows how to change to the interface-range configuration mode using the interface-range macro **enet\_list**:

```
Switch(config)# interface range macro enet_list
Switch(config-if)#
```

## Deploying SFP+ in X2 Ports



### Note

This feature is supported on Supervisor Engine 6-E and 6L-E as well as on WS-X4606-X2-E, WS-X4908-10GE, WS-X4904-10GE, and WS-C4900M.

To use an SFP+ in an X2 port to obtain 10-Gigabit Ethernet bandwidth, the Catalyst 4500 series switch supports OneX Convertor modules. When you plug a OneX Convertor module into an X2 port, it converts the X2 port into an SFP+ port into which you can plug in an SFP+. An SFP+ in a OneX Convertor module provides the same functionality as an X2 and maintains the same port numbering.

The output for the **show idprom tengigabitethernet slot/interface** command displays the contents of both the SFP+ and the OneX Convertor module EEPROMs when an SFP+ in a OneX Convertor module is plugged into an X2 port.

# Deploying 10-Gigabit Ethernet and Gigabit Ethernet SFP Ports on Supervisor Engine V-10GE



## Note

On a Catalyst 4510R series switch, if you enable both the 10-Gigabit Ethernet and Gigabit Ethernet SFP uplink ports, you must reboot the switch. On the Catalyst 4503, 4506, and 4507R series switches, this capability is automatically enabled.

Prior to Cisco IOS Release 12.2(25)SG, you could enable either the dual wire-speed 10-Gigabit Ethernet ports or four alternatively wired Gigabit Ethernet SFP uplink ports.

Beginning with Cisco IOS Release 12.2(25)SG, you could simultaneously deploy the dual 10-Gigabit Ethernet ports and the four Gigabit Ethernet SFP ports on the Catalyst 4503, Catalyst 4506, and Catalyst 4507R chassis.

When you deploy a Catalyst 4510R chassis, one of the following configurations is supported:

- Dual 10-Gigabit Ethernet ports (X2 optics) only.
- Four Gigabit Ethernet ports (SFP optics) only.
- Both the dual 10-Gigabit Ethernet and the four Gigabit Ethernet ports. The tenth slot (Flex-Slot) only supports a 2-port gigabit interface converter (GBIC) line card (WS-X4302-GB) when in this mode.
- You cannot place a line card with a backplane traffic capacity exceeding 6 Gbps in slots 8, 9, and 10 of a Catalyst 4510R-E chassis when used with a Supervisor Engine 6-E or 6L-E.

To select the 10-Gigabit Ethernet or the Gigabit Ethernet SFP uplink port, perform this task:

|        | Command                                                                                     | Purpose                                |
|--------|---------------------------------------------------------------------------------------------|----------------------------------------|
| Step 1 | Switch# <b>configure terminal</b>                                                           | Establishes global configuration mode. |
| Step 2 | Switch(config)# <b>hw-module uplink select</b> [all   gigabitethernet   tengigabitethernet] | Selects the port type to enable.       |

The following example shows how to enable both 10-Gigabit Ethernet and Gigabit Ethernet SFP uplink ports on a Catalyst 4510R series switch:

```
Switch# configure terminal
Switch(config)# hw-module uplink select all
Warning: This configuration mode will place slot 10 in flex slot mode
```



## Note

When you modify the uplink mode, you must reboot the switch.

## Configuring MultiGigabit Ports on WS-X4748-12X48U+E

Cisco's Multigigabit Ethernet technology allows you to leverage 802.11ac Wave 2 speeds on your device. Beginning in Cisco IOS Release 3.7.E1, you can configure the WS-X4748-12X48U+E module to auto-negotiate multiple speeds on switch ports, and support 100 Mbps, 1 Gbps, 2.5 Gbps, and 5 Gbps speeds on Category 5e cables, and up to 10 Gbps over Category 6 and Category 6a cables. For more information on supported cables, see [Supported Cable Types and Speed, page 8-15](#)

For more information on 802.11ac Wave 2, see [http://www.cisco.com/c/en/us/products/collateral/wireless/aironet-3600-series/white\\_paper\\_c11-713103.html](http://www.cisco.com/c/en/us/products/collateral/wireless/aironet-3600-series/white_paper_c11-713103.html).

This section includes:

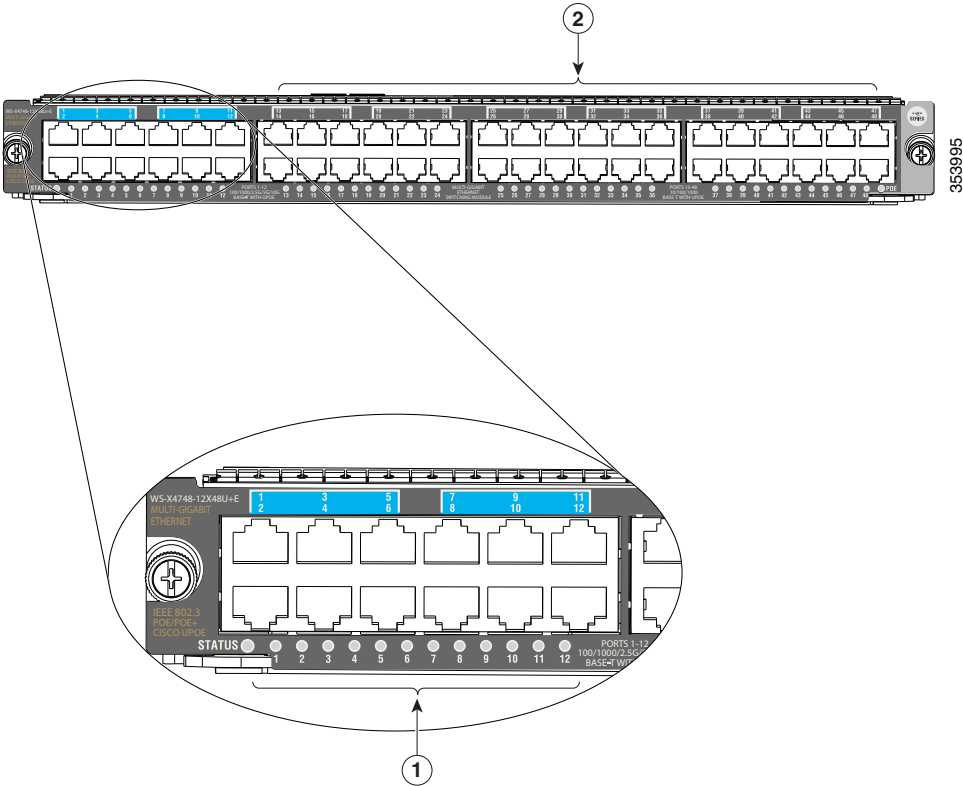
- [Module Modes on WS-X4748-12X48U+E Overview, page 8-14](#)
- [Configuring Module Modes on WS-X4748-12X48U+E, page 8-16](#)
- [Upgrading the Line Card FPGA Image on WS-X4748-12X48U+E, page 8-17](#)

For information about setting 2.5G, 5G and 10G interface speeds on WS-X4748-12X48U+E, see [Setting the Interface Speed, page 8-29](#).

# Module Modes on WS-X4748-12X48U+E Overview

The WS-X4748-12X48U+E module has 48 ports, of which the first 12 ports are 10-Gigabit Ethernet ports and, ports 13 to 48 are GigabitEthernet ports.

**Figure 8-3** The WS-X4748-12X48U+E module front panel



|   |                                             |   |                                          |
|---|---------------------------------------------|---|------------------------------------------|
| 1 | Ports 1 to 12 - Multigigabit Ethernet ports | 2 | Ports 13 to 48 - 1 GigabitEthernet ports |
|---|---------------------------------------------|---|------------------------------------------|

You can configure the WS-X4748-12X48U+E module in one of the 3 modes

### Mode 1 - Multigigabit Lite (Default)

- Ports 1 to 12 are 100/1000/2.5G/5G/10G Ethernet UPOE ports, oversubscribed 10:1 for 10Gbps port speed.
- Ports 13 to 48 are 10/100/1000 UPOE ports, with no oversubscription.

### Mode 2 - Multigigabit Enhanced

- Ports 1 to 12 are 100/1000/2.5G/5G/10G Ethernet UPOE ports, oversubscribed 5:1 for 10Gbps port speed. Ports 1 to 6 share 12G aggregate bandwidth, and ports 7 to 12 share 12G aggregate bandwidth.
- Ports 13 to 24 are inactive (disabled). The LED display for these ports, on the front panel of the device is Off.
- Ports 25 to 48 are 10/100/1000 UPOE ports, with no oversubscription.

### Mode 3 - Multigigabit Performance for 10Gbps port speed.

- Ports 1 to 12 are 100/1000/2.5G/5G/10G Ethernet UPOE ports, oversubscribed 2.5:1 for 10Gbps port speed. In this mode, ports 1 to 3, 4 to 6, 7 to 9, 10 to 12 share an aggregate bandwidth of 12G amongst the 3 ports in each group.
- Ports 13 to 48 are inactive (disabled). The LED display for these ports, on the front panel of the device is Off.



**Note**

10-Gigabit Ethernet, for links up to 100 meters, is supported on Category 6A cables or higher only.

## Restrictions for Multigigabit Ports



**Note**

These restrictions do not apply to ports 13 to 48 that do not support Multigigabit Ethernet

- Ports 1 to 12 do not support 10Mbps speed
- Ports 1 to 12 do not support half-duplex mode for 100Mbps speed.
- Ports 1 to 12 do not support Energy Efficient Ethernet.

## Supported Cable Types and Speed

**Table 8-1** Cable types and speed

| Cable Type  | 100Mbps | 1G  | 2.5G | 5G  | 10G             |
|-------------|---------|-----|------|-----|-----------------|
| Category 5e | Yes     | Yes | Yes  | Yes | N/A             |
| Category 6  | Yes     | Yes | Yes  | Yes | Yes (55 meters) |
| Category 6a | Yes     | Yes | Yes  | Yes | Yes             |

## Supported Hardware and Power Supply

**Table 8-2** Supported hardware and power supply

| Chassis Type                                                                                                                                                        | Supervisor                                                                                                                             | Power Supply                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Cisco Catalyst 4503-E</li> <li>Cisco Catalyst4506-E</li> <li>Cisco Catalyst4507R+E</li> <li>Cisco Catalyst4510R+E</li> </ul> | <ul style="list-style-type: none"> <li>Supervisor Engine 8-E</li> <li>Supervisor Engine 7-E</li> <li>Supervisor Engine 7L-E</li> </ul> | <ul style="list-style-type: none"> <li>PWR-C45-1300AC</li> <li>PWR-C45-2800AC</li> <li>PWR-C45-4200AC</li> <li>PWR-C45-6000AC</li> <li>PWR-C45-9000AC</li> <li>PWR-C45-1400AC<sup>1</sup></li> </ul> |

1. Power on Ethernet is not supported on PWR-C45-1400AC.

**Table 8-3** Hardware and power supply not supported

| Chassis Type                                                                                             | Supervisor                                                                                                   |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Cisco Catalyst 4507R-E</li> <li>Cisco Catalyst 4510R-E</li> </ul> | <ul style="list-style-type: none"> <li>Supervisor Engine 6-E, Supervisor Engine 6L-E and earlier.</li> </ul> |

## Configuring Module Modes on WS-X4748-12X48U+E



### Note

This mode command is applicable only to the selected module. When the mode command is changed for a module, the operation of other modules on the switch is not impacted.

|               | Command                                                                  | Purpose                                                 |
|---------------|--------------------------------------------------------------------------|---------------------------------------------------------|
| <b>Step 1</b> | Switch# <b>configure terminal</b>                                        | Establishes global configuration mode.                  |
| <b>Step 2</b> | Switch(config)# <b>hw-module module &lt;slot&gt; mode &lt;number&gt;</b> | Selects the configuration mode for the selected module. |



### Note

For the selected configuration to be applied, you must reset the module using the `Switch#hw-module module <slot> reset` command.

To verify that the selected configuration is applied, enter the `Switch#show module` command.

The following example shows how to configure an Ethernet mode on WS-X4748-12X48U+E:

```
Switch(config)#hw-module module 3 mode ?
1 Multigigabit lite :12 MultiGigabit ports(10:1 oversubscribed) and 36 1Gigabit ports
2 Multigigabit enhanced :12 MultiGigabit ports(5:1 oversubscribed) and 24 1Gigabit ports
3 Multigigabit performance :12 MultiGigabit ports(2.5:1 oversubscribed) only
```

For information about setting interface speeds to 2.5G, 5G or 10G, see [Setting the Interface Speed, page 8-29](#).



## Upgrading the Line Card FPGA Image on WS-X4748-12X48U+E

Beginning in Cisco IOS Release 3.7.1E, a new function to upgrade the line card FPGA on the WS-X4748-12X48U+E module has been introduced to handle oversubscription on multigigabit ports. This upgrade capability allows feature updates or fixes related to the line card FPGA on this module.



### Note

Before you begin, download the new FPGA image to the bootflash, to a TFTP server, or to a USB drive.



### Caution

Configuration for this module will be suspended during FPGA upgrade. The module is automatically reset after the upgrade.

To upgrade the line card FPGA on WS-X4748-12X48U+E:

|        | Command                                                                                           | Purpose                                          |
|--------|---------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Step 1 | Switch# <b>configure terminal</b>                                                                 | Establishes global configuration mode.           |
| Step 2 | Switch(config)# <b>hw-module module &lt;slot&gt;<br/>fpga-upgrade image &lt;path:filename&gt;</b> | Upgrades the line card FPGA image on the module. |

The following example shows how to upgrade the line card FPGA image:

```
Switch(config)#hw-module slot 1 fpga-upgrade image ?
```

bootflash: Path to Linecard FPGA image

tftp: Path to Linecard FPGA image

slot0: Path to Linecard FPGA image

usb0: Path to Linecard FPGA image

## Deploying 10-Gigabit Ethernet or Gigabit Ethernet Ports

To increase the flexibility of X2 ports, the Catalyst 4500 series switch as well as Catalyst 4900M and Catalyst 4948E support TwinGig Convertor modules. When you plug a TwinGig Convertor module into an X2 hole, it converts a single X2 hole (capable of holding one pluggable X2 optic) into two SFP holes (capable of holding two pluggable SFP optics). This enables you to have 10-Gigabit ports and 1-Gigabit ports on the same line card. It also allows you to use Gigabit ports, and then switch to a 10-Gigabit port, when needed.

This section includes these topics:

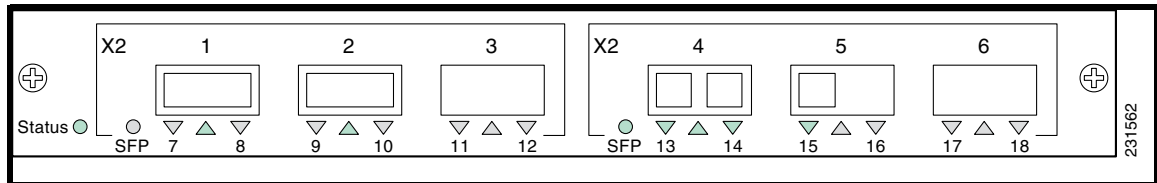
- Port Numbering TwinGig Convertors, page 8-17
- Limitations on Using a TwinGig Convertor, page 8-18
- Selecting X2/TwinGig Convertor Mode, page 8-18

### Port Numbering TwinGig Convertors

When a TwinGig Convertor is enabled or disabled, the number and type of ports on the line card change dynamically. The terminology must reflect this behavior. In Cisco IOS, 10-Gigabit ports are named *10-Gigabit* and 1-Gigabit ports are named *Gigabit*. Starting with Cisco IOS Release 12.2(40)SG, to

avoid having two ports named 10-Gigabit1/1 and Gigabit1/1, the 10-Gigabit and 1-Gigabit port numbers are independent. For example, for a WS-X4606-10GE-E module with six X2 holes, the X2 ports are named *10-Gigabit slot-num/<1-6>*, and the SFP ports are named *Gigabit slot-num/<7-18>*.

**Figure 8-4 Faceplate for WS-X4606-10GE**



In Cisco IOS, ports 1 through 18 always exist. This means that you can apply configurations on them and they display in the CLI output. However, only the X2 or the SFP ports can be active at any particular time. For example, if an X2 is plugged into the second hole, the X2 port 2 is active and SFP ports 9 and 10 are inactive. If a TwinGig Converter is plugged into the second hole, the X2 port 2 is inactive, and the SFP ports 9 and 10 are active. The inactive ports are treated analogously to the inactive ports on Supervisor Engines IV and V-10GE, where at no time are all of the uplinks connected to the switching ASICs.



**Note**

When using both TwinGig and X2 transceivers on the WS-X4606-X2-E module, place ports 1-3 in one group and ports 4-6 in another. (The mode selected with the **show hw-module module port-group** command determines the behavior. See [“Selecting X2/TwinGig Converter Mode”](#).) Mixing within a port group does not work. For example, you cannot have an X2 in port 1 and a TwinGig in port 2 and expect both of them to function.

## Limitations on Using a TwinGig Converter

Supervisor Engine 6-E, Supervisor Engine 6L-E, and Catalyst 4900M connect ports to the switching engine through a stub ASIC. This stub ASIC imposes some limitations on the ports: Gigabit and 10-Gigabit ports cannot be mixed on a single stub ASIC; they must either be all 10-Gigabit Ethernet (X2), or all Gigabit (TwinGig Converter and SFP). The faceplates of X2 modules show this stub port grouping, either with actual physical grouping with a box drawn around a grouping.

## Selecting X2/TwinGig Converter Mode

The default configuration mode is X2. If you plan to deploy 10-Gigabit Ethernet interfaces, you do not need to configure anything. However, if you want to deploy Gigabit interfaces (that is, use TwinGig Converters), you must configure the associated port-group:

To determine how the X2 holes on a module are grouped, enter the **show hw-module module m port-group p** command.



**Note**

Place a 10-Gigabit Ethernet port that accepts CVR-X2-SFP into 1-Gigabit mode instead of 10-Gigabit Ethernet mode.

If you configure a 10-Gigabit Ethernet port as 1-Gigabit port, an output similar to the following appears:

```
Switch# show hw-module module 5 port-group
```

```

Module Port-group Active Inactive

5 1 Gi5/3-6 Te5/1-2

```

If the port is set to the default, 10-Gigabit Ethernet mode, an output similar to the following appears:

```

Switch# show hw-module module 6 port-group
Module Port-group Active Inactive

6 1 Te6/1-2 Gi6/3-6

```

```
Switch# show int status mod 1
```

```

Port Name Status Vlan Duplex Speed Type
Tel1/1 Te1/1 notconnect 1 full 10G 10GBase-LR
Tel1/2 Te1/2 connected 1 full 10G 10GBase-LR
Tel1/3 Te1/3 notconnect 1 full 10G No X2
Tel1/4 Te1/4 notconnect 1 full 10G No X2
Tel1/5 Te1/5 notconnect 1 full 10G No X2
Tel1/6 Te1/6 notconnect 1 full 10G No X2
Gi1/7 Gi1/7 inactive 1 full 1000 No Gbic
Gi1/8 Gi1/8 inactive 1 full 1000 No Gbic
Gi1/9 Gi1/9 inactive 1 full 1000 No Gbic
Gi1/10 Gi1/10 inactive 1 full 1000 No Gbic
Gi1/11 Gi1/11 inactive 1 full 1000 No Gbic
Gi1/12 Gi1/12 inactive 1 full 1000 No Gbic
Gi1/13 Gi1/13 inactive 1 full 1000 No Gbic
Gi1/14 Gi1/14 inactive 1 full 1000 No Gbic
Gi1/15 Gi1/15 inactive 1 full 1000 No Gbic
Gi1/16 Gi1/16 inactive 1 full 1000 No Gbic
Gi1/17 Gi1/17 inactive 1 full 1000 No Gbic
Gi1/18 Gi1/18 inactive 1 full 1000 No Gbic
Switch#

```

- To configure the modes of operation for each X2 port group in which you want to deploy Gigabit, enter the **hw-module module *m* port-group *p* select gigabitethernet** command. This configuration is preserved across power cycles and reloads.

To deploy Gigabit Ethernet interfaces using the TwinGig Convertor, perform this task:

|        | Command                                                                                                            | Purpose                                                                                       |
|--------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Step 1 | Switch# <b>configure terminal</b>                                                                                  | Establishes global configuration mode.                                                        |
| Step 2 | Switch(config)# <b>hw-module module <i>m</i> port-group <i>p</i> select [gigabitethernet   tengigabitethernet]</b> | Selects the mode of operation for each X2 port-group.<br>Default is 10-Gigabit Ethernet (x2). |
| Step 3 | Switch(config)# <b>exit</b>                                                                                        | Exits configuration mode.                                                                     |
| Step 4 | Switch# <b>show int status mod <i>n</i></b>                                                                        | Verifies the setting.                                                                         |

This example shows how to select Gigabit Ethernet interfaces on a WS-X4606-10GE-E using the TwinGig Convertor:

```

Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# hw-module module 1 port-group 1 select gigabitethernet
Switch(config)# exit
Switch# show int status mod 1
Port Name Status Vlan Duplex Speed Type
Tel1/1 Te1/1 inactive 1 full 10G No X2
Tel1/2 Te1/2 inactive 1 full 10G No X2

```

|        |            |   |      |      |    |      |
|--------|------------|---|------|------|----|------|
| Te1/3  | inactive   | 1 | full | 10G  | No | X2   |
| Te1/4  | notconnect | 1 | full | 10G  | No | X2   |
| Te1/5  | notconnect | 1 | full | 10G  | No | X2   |
| Te1/6  | notconnect | 1 | full | 10G  | No | X2   |
| Gi1/7  | notconnect | 1 | full | 1000 | No | Gbic |
| Gi1/8  | notconnect | 1 | full | 1000 | No | Gbic |
| Gi1/9  | notconnect | 1 | full | 1000 | No | Gbic |
| Gi1/10 | notconnect | 1 | full | 1000 | No | Gbic |
| Gi1/11 | notconnect | 1 | full | 1000 | No | Gbic |
| Gi1/12 | notconnect | 1 | full | 1000 | No | Gbic |
| Gi1/13 | inactive   | 1 | full | 1000 | No | Gbic |
| Gi1/14 | inactive   | 1 | full | 1000 | No | Gbic |
| Gi1/15 | inactive   | 1 | full | 1000 | No | Gbic |
| Gi1/16 | inactive   | 1 | full | 1000 | No | Gbic |
| Gi1/17 | inactive   | 1 | full | 1000 | No | Gbic |
| Gi1/18 | inactive   | 1 | full | 1000 | No | Gbic |

## Invoking Shared-Backplane Uplink Mode on Supervisor Engine 6-E and Supervisor Engine 6L-E

This feature enables you to use all four 10-Gigabit Ethernet ports on the supervisor engines as blocking ports when in redundant mode.

Prior to Cisco IOS Release 12.2(40)SG, Catalyst 4500 Supervisor Engine V-10GE allowed you to enable either the dual wire-speed 10-Gigabit Ethernet ports or four TwinGig convertor based Gigabit Ethernet SFP uplink ports when operating in redundant mode.

Beginning with Cisco IOS Release 12.2(40)SG, you could deploy all four 10-Gigabit Ethernet ports, two blocking ports on an active supervisor engine and two blocking ports on the standby supervisor engine, or all eight Gigabit Ethernet SFP ports, four on the active supervisor and four on the standby supervisor engine. This capability is supported on all Catalyst 4500 and 4500E series chassis.

To enable shared-backplane mode, enter this command:

| Command                                                    | Purpose                                                                              |
|------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Switch(config)# <b>hw-mod uplink mode shared-backplane</b> | A reload of the active supervisor engine is required to apply the new configuration. |

To disable shared-backplane mode, enter this command:

| Command                                                       | Purpose                                                                              |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Switch(config)# <b>no hw-mod uplink mode shared-backplane</b> | A reload of the active supervisor engine is required to apply the new configuration. |

## Limitation and Restrictions on Supervisor Engine 8-E

- When you use Supervisor Engine 8-E in RPR or SSO mode, only the first four uplinks on each supervisor engine are available. The second set of four uplinks are unavailable.

- Memory utilization for the device is calculated using a combination of the **show memory location active** and the **show memory location active-dc** commands. With a daughter card enabled on Supervisor Engine 8-E, the CLI output for the command **show memory location active-dc** shows the value 0 for the config total as no configuration is stored in the daughter card.

## Limitation and Restrictions on Supervisor Engine 7-E and Supervisor Engine 7L-E

When you use WS-X45-SUP7-E in RPR or SSO mode, only the first two uplinks on each supervisor engine are available. The second two uplinks are unavailable.

## Selecting Uplink Mode on a Supervisor Engine 6-E

You can use the **hw-module uplink mode** command to change the uplink mode to either shared-backplane or tengigabitethernet mode.



### Note

Only two 10-Gigabit Ethernet ports or four 1-Gigabit Ethernet ports can be used on the supervisor engine.



### Note

When changing the uplink mode using the **hw-module uplink mode shared-backplane** command, you must reload the system. A message appears on the console to reflect this.

To select shared-backplane mode, do the following:

```
Switch(config)# hw-module uplink mode shared-backplane
A reload of the active supervisor is required to apply the new configuration.
Switch(config)# exit
Switch#
```

On a Supervisor Engine 6-E in a 6 or 7-slot chassis (Catalyst 4506-E, 4507R-E, and 4507R+E), the default uplink mode does not allow a WS-X4640-CSFP-E linecard to boot in the last slot because of a hardware limitation. After you the **hw-module uplink mode tengigabitethernet** command, you must reload the system to enable TenGigabit mode. The configuration is NVGEN'd after you save the running configuration to the startup configuration. You can use the **show run | incl uplink** command to check the uplink configuration before reloading the system. Furthermore, you can enter the **show hw-module uplink** command to display the uplink mode. It reports the current uplink mode, as well as the mode after the system reloads.

In uplink Ten Gigabit mode, the uplink is limited to two Ten Gigabit Ethernet interfaces in non-redundant and in redundant mode; Gigabit Ethernet interfaces are not supported. The WS-X4640-CSFP-E linecard boots in the last slot on 6 and 7-slot chassis. To return to default mode, reload the system from tengigabitethernet mode. SharedBackplane mode can be selected from Default mode, where a system reload is required as well.

The **hw-module module x port-group x select gigabitethernet** command is blocked in uplink TenGigabit mode, preventing you from selecting gigabitethernet mode.

## Support for WS-X46490-CSFP-E on a 10-slot Chassis

Starting with Release IOS XE 3.5.0E and IOS 15.2(1)E, the WS-X4640-CSFP-E linecard is supported in a 10-slot chassis for switch mode stand alone and switch mode virtual (VSS). New configurations are saved and reloaded so that the new configuration is applied to the entire switch.

To enable support for WS-X4640-CSFP-E on a 10-slot chassis, enter the following:

```
switch# configuration terminal
switch# hw-module system max-port-num-mode 2
```

To restore the default mode (**Mode 1**), you need to enter the following:

```
switch# configuration terminal
switch# no hw-module system max-port-num-mode 2
```

OR

```
switch# configuration terminal
switch# no hw-module system max-port-num-mode 1
```

OR

```
switch# configuration terminal
switch# hw-module system max-port-num-mode 1
```

Mode 1—a default mode in which the switch is configured to max Vfe subports of 48 per linecard; this configuration does not allow "WS-X4640-CSFP-E" in any of the 8 LC slots.

Mode 2—requires the above configuration to be copied to the startup-config. In this mode, only the first five slots of the chassis are eligible for the line cards. The remaining three slots are unuseable by any other line card including WS-X4640-CSFP-E, effectively reducing a 10-slot chassis to a 7-slot. You can place WS-X4640-CSFP-E in the top five slots, enabling you to use C-Sfp and thereby allow the max 80 ports on each WS-X4640-CSFP-E.

The behavior of a Supervisor Engine 6-E in Mode 2 (which is 10-slot chassis behaving effectively as a 7-slot chassis) matches that of a 7-slot chassis with Supervisor Engine 6-E. In Mode 2, the supervisor engine WS-X45-SUP6-E with the linecard WS-X4640-CSFP-E in the 7th slot will be inactive until an uplink mode change (using the **hw-module uplink mode tengigabitethernet** command) and a reboot. In this case, a syslog is printed to notify the presence of WS-X4640-CSFP-E in the 7th slot to prevent you from performing repetitive reboots.

To display the current mode in which the system is running, enter the following:

```
switch# show hw-module system max-port-num-mode
```



**Note**

---

This command is visible only on 10-slot chassis or if 10-slot chassis is present in VSS.

---

The output of this command is:

```
Active max-port-num-mode configuration is 2
In this mode, last 3 Line card slots shall not be active"
```

In VSS, this output provides the current mode of both active and standby switches.

# Configuring Supervisor Engine 7-E Uplink Mode on Supervisor Engine 8-E

In a ten-slot chassis, by default, Supervisor Engine 8-E supports 80GB uplink bandwidth. The supervisor supports eight active interfaces in non-redundancy mode and the four interfaces on both active and standby supervisors, in redundancy mode. Only 47xx series line cards are supported in the tenth slot of the 4510 R+E chassis. The 4510R-E chassis does not support any line cards in the tenth slot, when the daughter card is activated.

When the daughter card is activated, Supervisor Engine 8-E restricts uplink bandwidth to 40GB.

For all non-ten-slot chassis (3,6, and 7-slot chassis), Supervisor Engine 8-E mode allows 80GB uplink bandwidth, even with the daughter card activated.

## Supervisor Engine 7-E Mode on Supervisor Engine 8-E



### Note

You can configure Supervisor Engine 7-E mode (Sup7-E mode) on Supervisor Engine 8-E in a 10-slot chassis only.

When Sup 7-E mode is activated, the Supervisor Engine 8-E baseboard uplink bandwidth is restricted to 40GB as default configuration in a ten-slot chassis. In non-redundancy mode, the supervisor can support the 4 active interfaces. In redundancy mode, this mode supports the first two interfaces on both active and standby supervisors. All line cards are supported in all ten slots in the chassis, with no restriction on the tenth slot.

To activate Sup7-E mode, you must deactivate the daughter card on the switch.

## Supervisor Engine 8-E with Daughter Card Enabled

By default the daughter card is activated when the supervisor engine is booted in Install Boot mode, and deactivated when the supervisor engine is booted in Bundle Boot mode.

When the daughter card is activated, Supervisor Engine 8-E baseboard uplink bandwidth is restricted to 40G as the default configuration in a ten-slot chassis. In non-redundancy mode, the supervisor can support the first 4 active interfaces. In redundancy mode, the first two interfaces on both the active and the standby supervisors become active. Only 47xx series modules are supported in the tenth slot of the 4510 R+E chassis. The 4510R-E chassis does not support any line cards in the tenth slot, when the daughter card is activated.

## Supervisor Engine 8-E Uplink Configurations

The following table displays the default uplink configuration for Supervisor Engine 8-E, based on the redundancy mode and whether the daughter card is activated.

**Table 8-4**      **Sup 8-E Uplink Configuration Modes**

| <b>Supervisor Configuration</b> | <b>Uplink Ports</b>        | <b>Wireless Termination/Daughter Card</b> | <b>Linecard/Chassis Restrictions</b>                                               | <b>User Configuration</b>                                                                                                                            |
|---------------------------------|----------------------------|-------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Single Supervisor (Sup7E Mode)  | 4x10GE                     |                                           | 10-slot Chassis: No restriction                                                    | Requires CLI configuration followed by a supervisor engine reload.                                                                                   |
|                                 |                            |                                           | 3,6 and 7 Slot Chassis: Configuration not supported                                |                                                                                                                                                      |
| Single Supervisor               | 4x10GE                     | 20GE                                      | 10-slot Chassis: Restriction on the 10th slot.*                                    | Default configuration in Install Boot mode.                                                                                                          |
|                                 |                            |                                           | 3,6 and 7 Slot Chassis: No restriction                                             |                                                                                                                                                      |
| Single Supervisor               | 8x10GE                     |                                           | 10-slot Chassis: Restriction on the 10th slot.*                                    | Default configuration in Bundle Boot mode.                                                                                                           |
|                                 |                            |                                           | 3,6 and 7 Slot Chassis: No restriction                                             |                                                                                                                                                      |
| Single Supervisor               | 8x10GE                     |                                           | 10-slot Chassis: Restriction on the 10th slot.*<br>Wireless/Daughter Card enabled. | Default configuration in Install Boot mode.<br>Requires CLI configuration to force disable the daughter card followed by a supervisor engine reload. |
|                                 |                            | 20GE                                      | 3,6 and 7 Slot Chassis: No restriction                                             |                                                                                                                                                      |
| Dual Supervisor (Sup 7-E mode)  | Active Supervisor: 2x10GE  |                                           | 10-slot Chassis: No restriction                                                    | Requires CLI configuration followed by a supervisor engine reload.                                                                                   |
|                                 | Standby Supervisor: 2x10GE |                                           | 3,6 and 7 Slot Chassis: Configuration not supported                                |                                                                                                                                                      |
| Dual Supervisor                 | Active Supervisor: 2x10GE  | 20GE                                      | 10-slot Chassis: Restriction on the 10th slot.*                                    | Default configuration in Install Boot mode.                                                                                                          |
|                                 | Standby Supervisor: 2x10GE |                                           | 3,6 and 7 Slot Chassis: Configuration not supported                                |                                                                                                                                                      |
| Dual Supervisor                 | Active Supervisor: 4x10GE  |                                           | 10-slot Chassis: Restriction on the 10th slot.*                                    | Default configuration in Bundle Boot mode.<br>Requires CLI configuration followed by a supervisor engine reload.                                     |
|                                 | Standby Supervisor: 4x10GE |                                           | 3,6 and 7 Slot Chassis: No restriction                                             |                                                                                                                                                      |



**Table 8-4**      **Sup 8-E Uplink Configuration Modes**

| Supervisor Configuration | Uplink Ports                  | Wireless Termination/Daughter Card | Linecard/Chassis Restrictions                                                               | User Configuration                                                                                                                                    |
|--------------------------|-------------------------------|------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dual Supervisor          | Active Supervisor:<br>4x10GE  | 20GE                               | 10-slot Chassis:<br>Restriction on the 10th slot.*<br><br>Wireless Mode enabled by default. | Default configuration in Install Boot mode.<br>Requires CLI configuration to force disabled the daughter card followed by a supervisor engine reload. |
|                          | Standby Supervisor:<br>4x10GE |                                    | 3,6 and 7 Slot Chassis:<br>No restriction                                                   | Default configuration in Install Boot mode.                                                                                                           |

\*Only 47xx series line cards are supported in the tenth slot of the 4510 R+E chassis. The 4510R-E chassis does not support any line cards in the tenth slot, when the daughter card is enabled.

## Restrictions for Configuring Sup 7-E Uplink Mode on Supervisor Engine 8-E

- In Install Boot mode, Supervisor Engine 7-E cannot be configured directly configured as the daughter card is activated by default.
- Supervisor Engine 7-E mode cannot be configured on a 3, 6, and 7-slot chassis.
- Supervisor Engine 7-E mode is supported only for a symmetric VSS system.

## Configuring Supervisor Engine 7-E Mode on Supervisor Engine 8-E



### Note

Before you begin, ensure that the daughter card is deactivated on the switch.

By default, the daughter card is activated when the supervisor engine is booted in Install Boot mode and you cannot configure Supervisor Engine 7-E (Sup 7-E) mode until you deactivate the daughter card on the switch.



### Note

Ensure that the supervisor engine is reloaded each time you make uplink configuration changes.

To deactivate the daughter card, enter the following commands:

## Selecting the Uplink Port on a Supervisor Engine 7L-E

|               | Command                                                                                                                                         | Purpose                                                                                                            |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | <code>switch (config)# hw-module daughtercard disable</code>                                                                                    | Deactivates the daughter card on the switch.<br><br><b>Note</b> This command is not available in Bundle Boot mode. |
| <b>Step 2</b> | Save the configuration and perform a power cycle or reload the supervisor.<br><br>Then enter:<br><code>switch# sh hw-module daughtercard</code> | Displays updated daughter card details for Supervisor Engine 8-E, after the supervisor engine is reloaded.         |

The **no** form of the `hw-module daughtercard disable` command activates the daughter card.

To enable Sup7-E mode on Supervisor Engine 8-E, when the daughter card is deactivated, enter the following commands:

|               | Command                                                                                                                                      | Purpose                                                      |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>Step 1</b> | <code>switch (config)# hw-module uplink mode 40Gig</code>                                                                                    | Configures the uplink mode to 40GB.                          |
| <b>Step 2</b> | Save the configuration and perform a power cycle or reload the supervisor.<br><br>Then enter:<br><code>switch# show run   incl uplink</code> | Displays the uplink configuration for Supervisor Engine 8-E. |

The **no** form of the `hw-module uplink mode 40Gig` command restores the default Supervisor Engine 8-E mode.

## Selecting the Uplink Port on a Supervisor Engine 7L-E

With Cisco IOS Release 15.0(2)SG, the SFP+/SFP uplink modes on Supervisor Engine 7L-E (WS-X45-SUP-7L-E) have changed. The number of uplink ports now depends on the supervisor engine mode (single or redundant) and the uplink mode configuration (1-Gigabit or 10-Gigabit). To configure the uplink mode, use the `hw-module uplink select [gigabitethernet/ tengigabitethernet]` command, as follows:

```
Switch(config)# hw-module uplink select?
gigabitethernet Select the gigabit uplinks
tengigabitethernet Select the 10G uplinks
```



### Note

Supervisor Engine 7L-E is not supported on a ten-slot chassis. USB device and SD card support is applicable to Supervisor Engine 7-E and Supervisor Engine 8-E only.



### Note

Supervisor Engine 8-E is supported on a 10-slot chassis.

## Single Supervisor Mode

In single supervisor mode, WS-X45-SUP-7L-E supports the uplink configuration of at most either two 10-Gigabit or four 1-Gigabit ports (Table 8-5).

**Table 8-5 Uplink Options for Single Supervisor Mode**

| Supervisor Engine Uplink Ports                                  |      | Speeds Achievable with the Following Combination of Pluggables (Band Width) |
|-----------------------------------------------------------------|------|-----------------------------------------------------------------------------|
| A1                                                              | A2   |                                                                             |
| Choose 10-Gigabit operation through the command line interface. |      |                                                                             |
| SFP+                                                            | SFP+ | 20 Gbps                                                                     |
| SFP+                                                            | SFP  | 11 Gbps                                                                     |

SFP+ and SFP can be inserted in any order for lines 2 to 4.

## Redundant Supervisor Mode

In redundant supervisor mode, WS-X45-SUP-7L-E supports 1+1 (in 10-Gigabit mode) and 2+2 (in 1-Gigabit mode) (Table 8-6).

**Table 8-6 Uplink Options for Redundant Supervisor Mode**

| Active Supervisor Uplink Ports                                  |     |    |    | Standby Supervisor Uplink Ports |     |    |    |                                                       |
|-----------------------------------------------------------------|-----|----|----|---------------------------------|-----|----|----|-------------------------------------------------------|
| A1                                                              | A2  | A3 | A4 | B1                              | B2  | B3 | B4 | Speeds Achievable with this Combination of Pluggables |
| Choose 10-Gigabit operation through the command line interface. |     |    |    |                                 |     |    |    |                                                       |
| SFP+                                                            |     | —  | —  | SFP+                            |     | —  | —  | 20 Gbps                                               |
| SFP+                                                            |     | —  | —  | SFP                             |     | —  | —  | 11 Gbps                                               |
| SFP                                                             |     | —  | —  | SFP+                            |     | —  | —  | 11 Gbps                                               |
| SFP                                                             | SFP | —  | —  | SFP                             | SFP | —  | —  | 4 Gbps                                                |

## Digital Optical Monitoring Transceiver Support

Command line interface (CLI) commands (**show inventory**, **show idprom interface**) are used on transceivers to obtain serial number, model name, inventory information.

The following commands are specific to the transceivers that support the DOM capability:

- Displays current values and thresholds for all sensor on a particular interface transceiver:  

```
show interfaces int-name transceiver [detail] [threshold]
```
- Enables or disables the *entSensorThresholdNotification* for all sensors in all the transceivers:  

```
snmp-server enable trap transceiver
```
- Enables or disables transceiver monitoring:

```
transceiver type all
monitoring
```

**Note**

This feature is only available when a DOM capable transceiver is present and configured for monitoring. The frequency at which the sensor information is refreshed depends on default values configured in the transceiver EEPROM (Serial Electrically Erasable Programmable Read Only Memory).

**Note**

For details on transceiver module compatibility, refer to this URL:

[http://www.cisco.com/en/US/products/hw/modules/ps5455/products\\_device\\_support\\_tables\\_list.html](http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html)

## Configuring Optional Interface Features

The following sections describe optional procedures:

- [Configuring Ethernet Interface Speed and Duplex Mode, page 8-28](#)
- [Configuring Flow Control, page 8-34](#)
- [Configuring Jumbo Frame Support, page 8-36](#)
- [Interacting with Baby Giants, page 8-40](#)
- [Configuring the Port Debounce Timer, page 8-40](#)
- [Configuring Auto-MDIX on a Port, page 8-41](#)

## Configuring Ethernet Interface Speed and Duplex Mode

Topics include:

- [Speed and Duplex Mode Configuration Guidelines, page 8-28](#)
- [Setting the Interface Speed, page 8-29](#)
- [Setting the Interface Duplex Mode, page 8-32](#)
- [Displaying the Interface Speed and Duplex Mode Configuration, page 8-32](#)
- [Adding a Description for an Interface, page 8-34](#)

### Speed and Duplex Mode Configuration Guidelines

**Note**

You do not configure the client device for autonegotiation. Instead, you configure the switch with the speed, or range of speeds, that you want to autonegotiate.

You can configure the interface speed and duplex mode parameters to **auto** and allow the Catalyst 4006 switch with Supervisor Engine III to negotiate the interface speed and duplex mode between interfaces. If you decide to configure the interface **speed** and **duplex** commands manually, consider the following:

- If you enter the **no speed** command, the switch automatically configures both interface **speed** and **duplex** to **auto**.

- When you set the interface speed to **1000** (Mbps) or **auto 1000**, the duplex mode is full duplex. You cannot change the duplex mode.
- If the interface speed is set to **10** or **100**, the duplex mode is set to half duplex by default unless you explicitly configure it.

On a Catalyst 4500-X switch, the duplex mode is always automatically configured as full duplex (whether you set the interface speed to **10** or **100**). You cannot change this.

**Caution**

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

## Setting the Interface Speed

If you set the interface speed to **auto** on a 10/100-Mbps Ethernet interface, speed and duplex are autonegotiated. The forced 10/100 autonegotiation feature allows you to limit interface speed auto negotiation up to 100 Mbps on a 10/100/1000BASE-T port.

To set the port speed for a 10/100-Mbps Ethernet interface, perform this task:

|        | Command                                                      | Purpose                                   |
|--------|--------------------------------------------------------------|-------------------------------------------|
| Step 1 | Switch(config)# <b>interface fastethernet</b> slot/interface | Specifies the interface to be configured. |
| Step 2 | Switch(config-if)# <b>speed</b> [10   100   auto [10   100]] | Sets the interface speed.                 |

This example shows how to set the interface speed to 100 Mbps on the Fast Ethernet interface 5/4:

```
Switch(config)# interface fastethernet 5/4
Switch(config-if)# speed 100
```

This example shows how to allow Fast Ethernet interface 5/4 to autonegotiate the speed and duplex mode:

```
Switch(config)# interface fastethernet 5/4
Switch(config-if)# speed auto
```

**Note**

The preceding CLI is analogous to **speed auto 10 100**.

This example shows how to limit the interface speed to 10 and 100 Mbps on the Gigabit Ethernet interface 1/1 in auto-negotiation mode:

```
Switch(config)# interface gigabitethernet 1/1
Switch(config-if)# speed auto 10 100
```

This example shows how to limit speed negotiation to 100 Mbps on the Gigabit Ethernet interface 1/1:

```
Switch(config)# interface gigabitethernet 1/1
Switch(config-if)# speed auto 100
```

**Note**

Turning off autonegotiation on a Gigabit Ethernet interface results in the port being forced into 1000 Mbps and full-duplex mode.

To turn off the port speed autonegotiation for Gigabit Ethernet interface 1/1, perform this task:

|        | Command                                             | Purpose                                    |
|--------|-----------------------------------------------------|--------------------------------------------|
| Step 1 | Switch(config)# <b>interface gigabitethernet1/1</b> | Specifies the interface to be configured.  |
| Step 2 | Switch(config-if)# <b>speed nonegotiate</b>         | Disables autonegotiation on the interface. |

To restore autonegotiation, enter the **no speed nonegotiate** command in the interface configuration mode.

**Note**

For the blocking ports on the WS-X4416 module, do not set the speed to autonegotiate.

To set port speed to 10/ 100 Mbps on a 10-Gigabit Ethernet interface (on a 1000Base-T port), perform this task:

|        | Command                                                                          | Purpose                                                                                               |
|--------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Step 1 | Switch(config)# <b>interface</b> <b>tengigabitethernet</b> <i>slot/interface</i> | Specifies the interface to be configured.                                                             |
| Step 2 | Switch(config-if)# <b>speed</b> [10   100]                                       | Sets the interface speed.<br><br>Forced 10/100 auto-negotiation is not supported on a 1000Base-T port |

To restore autonegotiation (default setting), enter the **no speed** command in the interface configuration mode.

This example shows how to set the interface speed to 100 Mbps on a 10-Gigabit Ethernet interface 2/4:

```
Switch(config)# interface tengigabitethernet 2/4
Switch (config-if)# speed 100
```

To set port speed to 2500Mbps(2.5Gbps)/5000Mbps (5Gbps)/10000Mbps (10Gbps) on a Multigigabit Ethernet interface (on a 1000Base-T port), perform this task:

**Note**

For Multigigabit Ethernet ports 1 to 12, autonegotiation is enabled by default, and the link is active if both peers are Multigigabit Ethernet ports, and if forced speed is configured.

For 1 Gigabit Ethernet ports 13 to 48, the link is active only if autonegotiation is enabled at least at one end, and forced speed is configured.

**Note**

Only ports 1 to 12 on the WS-X4748-12X48U+E module support Multigigabit Ethernet. For more information see [Configuring MultiGigabit Ports on WS-X4748-12X48U+E, page 8-13](#).

|        | Command                                                                                                             | Purpose                                                                                                        |
|--------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Step 1 | Switch(config)# <b>interface</b> <b>tengigabitethernet</b> <i>slot/interface</i>                                    | Specifies the interface to be configured.                                                                      |
| Step 2 | Switch(config-if)# <b>speed</b> [100   1000   2500   5000   10000   <b>auto</b> [100   1000   2500   5000   10000]] | Sets the interface speed.<br><br><b>Note</b> 10G speed is supported only on Category 6 and Category 6A cables. |

To restore autonegotiation (default setting), enter the **no speed** command in the interface configuration mode.

This example shows how to set the interface speed to 5G on the Multigigabit Ethernet interface 3/1:

```
Switch(config)# interface tengigabitethernet 3/1
Switch (config-if)# speed 5000
```

This example shows how to allow the Multigigabit Ethernet interface 3/1 to autonegotiate the speed and duplex mode:

```
Switch(config)# interface gigabitethernet 3/1
```

```
Switch(config-if)# speed auto
```

This example shows how to limit speed negotiation to 2.5G on the Multigigabit Ethernet interface 3/1:

```
Switch(config)# interface gigabitethernet 3/1
Switch(config-if)# speed auto 2500
```

## Setting the Interface Duplex Mode



### Note

When the interface is set to 1000 Mbps, 2.5G, 5G or 10G, you cannot change the duplex mode from full duplex to half duplex.

To set the duplex mode of a Fast Ethernet interface, perform this task:

|        | Command                                                      | Purpose                                   |
|--------|--------------------------------------------------------------|-------------------------------------------|
| Step 1 | Switch(config)# <b>interface fastethernet slot/interface</b> | Specifies the interface to be configured. |
| Step 2 | Switch(config-if)# <b>duplex [auto   full   half]</b>        | Sets the duplex mode of the interface.    |

This example shows how to set the interface duplex mode to full on Fast Ethernet interface 5/4:

```
Switch(config)# interface fastethernet 5/4
Switch(config-if)# duplex full
```

## Displaying the Interface Speed and Duplex Mode Configuration

To display the interface speed and duplex mode configuration for an interface, enter this command:

| Command                                                                                             | Purpose                                                     |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Switch# <b>show interfaces [fastethernet   gigabitethernet   tengigabitethernet] slot/interface</b> | Displays the interface speed and duplex mode configuration. |



This example shows how to display the interface speed and duplex mode of Fast Ethernet interface 6/1:

```
Switch# show interface fastethernet 6/1
FastEthernet6/1 is up, line protocol is up
 Hardware is Fast Ethernet Port, address is 0050.547a.dee0 (bia 0050.547a.dee0)
 MTU 1500 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
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input 00:00:54, output never, output hang never
 Last clearing of "show interface" counters never
 Input queue: 50/2000/0/0 (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
 50 packets input, 11300 bytes, 0 no buffer
 Received 50 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
 1456 packets output, 111609 bytes, 0 underruns
 0 output errors, 0 collisions, 0 interface resets
 0 babbles, 0 late collision, 0 deferred
 1 lost carrier, 0 no carrier
 0 output buffer failures, 0 output buffers swapped out
Switch#
```

This example shows how to display the interface speed and duplex mode of 10-Gigabit Ethernet interface 1/5:

```
Switch# show interface tengigabitethernet 1/5
TenGigabitEthernet1/5 is up, line protocol is up (connected)
 Hardware is Ten Gigabit Ethernet Port, address is 0022.bde2.0f6d (bia 0022.bde2.0f6d)
 MTU 1500 bytes, BW 10000000 Kbit/sec, DLY 10 usec,
 reliability 255/255, txload 1/255, rxload 1/255
 Encapsulation ARPA, loopback not set
 Keepalive set (10 sec)
 Full-duplex, 10Gb/s, link type is auto, media type is 10GBase-SR
 input flow-control is on, output flow-control is on
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input 00:00:01, output never, output hang never
 Last clearing of "show interface" counters never
 Input queue: 0/2000/0/0 (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
 39 packets input, 8286 bytes, 0 no buffer
 Received 39 broadcasts (39 multicasts)
 0 runts, 0 giants, 0 throttles
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
 0 input packets with dribble condition detected
 308 packets output, 30276 bytes, 0 underruns
 0 output errors, 0 collisions, 3 interface resets
 0 unknown protocol drops
 0 babbles, 0 late collision, 0 deferred
 0 lost carrier, 0 no carrier
 0 output buffer failures, 0 output buffers swapped out
Switch#
```

## Adding a Description for an Interface

You can add a description about an interface to help you remember its function. The description appears in the output of the following commands: **show configuration**, **show running-config**, and **show interfaces**.

To add a description for an interface, enter the following command:

| Command                                             | Purpose                              |
|-----------------------------------------------------|--------------------------------------|
| Switch(config-if)# <b>description</b> <i>string</i> | Adds a description for an interface. |

This example shows how to add a description on Fast Ethernet interface 5/5:

```
Switch(config)# interface fastethernet 5/5
Switch(config-if)# description Channel-group to "Marketing"
```

## Configuring Flow Control

Gigabit Ethernet ports use flow control to slow down the transmission of incoming packets. If a buffer on a Gigabit Ethernet port runs out of space, the port transmits a special packet that requests remote ports to delay sending packets for a period of time. The port can also receive this special packet from its link partner for the same purpose. This special packet is called a *pause frame*.

The default settings for Gigabit Ethernet interfaces are as follows:

- Sending pause frames is off—Non-oversubscribed Gigabit Ethernet interfaces.
- Receiving pause frames is desired—Non-oversubscribed Gigabit Ethernet interfaces.
- Sending pause frames is on—Oversubscribed Gigabit Ethernet interfaces.
- Receiving pause frames is desired—Oversubscribed Gigabit Ethernet interfaces

The default settings for 10-Gigabit Ethernet interfaces are as follows:

- Sending pause frames is off.
- Receiving pause frames is on.



### Note

**desired** is not a flow control option on the 10-Gigabit Ethernet interfaces.

To configure flow control, perform this task:

|        | Command                                                                                                            | Purpose                                                                                        |
|--------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Step 1 | Switch# <b>configure terminal</b>                                                                                  | Enters global configuration mode.                                                              |
| Step 2 | Switch(config)# <b>interface</b> <i>interface-id</i>                                                               | Enters interface configuration mode and specifies the interface to be enabled for flowcontrol. |
| Step 3 | Switch(config-if)# <b>flowcontrol</b> { <b>receive</b>   <b>send</b> } { <b>off</b>   <b>on</b>   <b>desired</b> } | Configures a Gigabit Ethernet port to send or receive pause frames.                            |
| Step 4 | Switch(config-if)# <b>end</b>                                                                                      | Returns to configuration mode.                                                                 |
| Step 5 | Switch(config)# <b>end</b>                                                                                         | Returns to privileged EXEC mode.                                                               |

This example shows how to configure flow control on an oversubscribed Gigabit Ethernet port 7/5:

```
Switch# configure terminal
Switch(config)# interface g7/5
Switch(config-if)# flowcontrol send on
Switch(config-if)# end
Switch)# show interfaces gigabitEthernet 7/5 capabilities
GigabitEthernet7/5
 Model: WS-X4548-GB-RJ45-RJ-45
 Type: 10/100/1000-TX
 Speed: 10,100,1000,auto
 Duplex: half,full,auto
 Trunk encap. type: 802.1Q,ISL
 Trunk mode: on,off,desirable,nonegotiate
 Channel: yes
 Broadcast suppression: percentage(0-100), hw
 Flowcontrol: rx-(off,on,desired),tx-(off,on,desired)
 VLAN Membership: static, dynamic
 Fast Start: yes
 Queuing: rx-(N/A), tx-(1p3q1t, Sharing/Shaping)
 CoS rewrite: yes
 ToS rewrite: yes
 Inline power: no
 SPAN: source/destination
 UDLD: yes
 Link Debounce: no
 Link Debounce Time: no
 Port Security: yes
 Dot1x: yes
 Maximum MTU: 1552 bytes (Baby Giants)
 Multiple Media Types: no
 Diagnostic Monitoring: N/A

Switch)# show flowcontrol interface GigabitEthernet 7/5
Port Send FlowControl Receive FlowControl RxPause TxPause
 admin oper admin oper

Gi7/5 on off desired off 0 0
```

This example shows the output of the **show interfaces** and **show flow control** commands on a non-oversubscribed Gigabit Ethernet port 5/5:

```
Switch# show interfaces gigabitEthernet 5/5 capabilities
GigabitEthernet5/5
 Model: WS-X4306-GB-Gbic
 Type: No Gbic
 Speed: 1000
 Duplex: full
 Trunk encap. type: 802.1Q,ISL
 Trunk mode: on,off,desirable,nonegotiate
 Channel: yes
 Broadcast suppression: percentage(0-100), hw
 Flowcontrol: rx-(off,on,desired),tx-(off,on,desired)
 VLAN Membership: static, dynamic
 Fast Start: yes
 Queuing: rx-(N/A), tx-(1p3q1t, Sharing/Shaping)
 CoS rewrite: yes
 ToS rewrite: yes
 Inline power: no
 SPAN: source/destination
 UDLD: yes
 Link Debounce: no
 Link Debounce Time: no
 Port Security: yes
```

```

Dot1x: yes
Maximum MTU: 9198 bytes (Jumbo Frames)
Multiple Media Types: no
Diagnostic Monitoring: N/A

```

```

Switch# show flowcontrol interface gigabitEthernet 5/5
Port Send FlowControl Receive FlowControl RxPause TxPause
 admin oper admin oper

Gi5/5 off off desired off 0 0

```

This example shows the output of the **show interfaces** and **show flowcontrol** commands on an unsupported Fast Ethernet port 3/5:

```

Switch# show interfaces fa3/5 capabilities
FastEthernet3/5
 Model: WS-X4148-RJ-45
 Type: 10/100BaseTX
 Speed: 10,100,auto
 Duplex: half,full,auto
 Trunk encap. type: 802.1Q,ISL
 Trunk mode: on,off,desirable,nonegotiate
 Channel: yes
 Broadcast suppression: percentage(0-100), sw
 Flowcontrol: rx-(none),tx-(none)
 VLAN Membership: static, dynamic
 Fast Start: yes
 Queuing: rx-(N/A), tx-(lp3q1t, Shaping)
 CoS rewrite: yes
 ToS rewrite: yes
 Inline power: no
 SPAN: source/destination
 UDLD: yes
 Link Debounce: no
 Link Debounce Time: no
 Port Security: yes
 Dot1x: yes
 Maximum MTU: 1552 bytes (Baby Giants)
 Multiple Media Types: no
 Diagnostic Monitoring: N/A

Switch# show flowcontrol interface fa3/5
Port Send FlowControl Receive FlowControl RxPause TxPause
 admin oper admin oper

Fa3/5 Unsupp. Unsupp. Unsupp. Unsupp. 0 0

```

## Configuring Jumbo Frame Support

These sections describe jumbo frame support:

- [Ports and Modules That Support Jumbo Frames, page 8-36](#)
- [Jumbo Frame Support, page 8-37](#)
- [Configuring MTU Sizes, page 8-39](#)

### Ports and Modules That Support Jumbo Frames

The following ports and modules support jumbo frames:

- Supervisor uplink ports
- WS-C4500X ports
- WS-X4306-GB: all ports
- WS-X4232-GB-RJ: ports 1-2
- WS-X4418-GB: ports 1-2
- WS-X4412-2GB-TX: ports 13-14
- WS-X4506-GB-T
- the 4648-GB-RJ45V
- WS-X4648-GB+RJ45V
- WS-X4648-RJ45V-E
- WS-X4648-RJ45V+E
- WS-X4706-10GE

## Jumbo Frame Support

These sections describe jumbo frame support:

- [Maximum Transmission Units, page 8-37](#)
- [Jumbo Frame Support Overview, page 8-37](#)
- [Ethernet Ports, page 8-38](#)
- [VLAN Interfaces, page 8-38](#)

### Maximum Transmission Units

The Catalyst 4500 series switch allows you to configure a maximum of 32 different maximum transmission unit (MTU) sizes system wide. This means that the maximum number of different MTU sizes that you can configure with the **system mtu**, **mtu**, **ip mtu**, and **ipv6 mtu** command on all Layer 2 and Layer 3 interfaces combined is 32.

Also, the system stores the IPv4 and IPv6 MTU sizes configured on an interface separately. For every **system mtu** command or per interface **mtu** command, two separate MTU values are stored, one for IPv4 and one for IPv6. This further reduces the number of slots available (out of 32). However, only a single MTU value is stored for each **ip mtu** and **ipv6 mtu** commands.

If the new MTU value you are configuring is already present in the system (that is, configured on some other interface), then no new slot(s) are allocated to store it again.

If the maximum limit of 32 is reached and an attempt is made to configure a new MTU size on a new interface, the system only allows configuration to proceed if the new MTU size has previously been configured on some interface. Otherwise, an error message is displayed and the default MTU size is assigned to the interface being configured.

### Jumbo Frame Support Overview

A jumbo frame is a frame larger than the default Ethernet size. Enable jumbo frame support by configuring a larger-than-default MTU size on a port or interface.

Catalyst 4500 series switch Ethernet LAN ports configured with a nondefault MTU size accept frames containing packets with a size between 1500 and 9216 bytes (including Ethernet payload, header and trailer). (The maximum MTU size for a Catalyst 4948 series switch is 9198 bytes (not including header and trailer.)) With a nondefault MTU size configured, the packet size of ingress frames is checked. If the packet is larger than the configured MTU, it is dropped.

For traffic that needs to be routed, the MTU of the egress port is checked. If the MTU is smaller than the packet size, the packet is forwarded to the CPU. If the “do not fragment bit” is not set, it is fragmented. Otherwise, the packet is dropped.

**Note**

---

Jumbo frame support does not fragment Layer 2 switched packets.

---

The Catalyst 4500 series switch does not compare the packet size with the MTU at the egress port, but jumbo frames are dropped in ports that do not support them. The frames can be transmitted in ports that do support jumbo frames, even though the MTU is not configured to jumbo size.

**Note**

---

Jumbo frame support is only configured per interface; jumbo frame support cannot be configured globally.

---

## Ethernet Ports

These sections describe configuring nondefault MTU sizes on Ethernet ports:

- [Ethernet Port Overview, page 8-38](#)
- [Layer 3 and Layer 2 EtherChannels, page 8-38](#)

### Ethernet Port Overview

Starting with Cisco IOS Release 12.2(31)SGA, configuring a nondefault MTU size on certain Ethernet ports limits the size of ingress packets. The MTU does not impact the egress packets.

Prior to Cisco IOS Release 12.1(13)EW, you could configure the MTU size only on Gigabit Ethernet.

### Layer 3 and Layer 2 EtherChannels

Starting with Release Cisco IOS Release 12.2(31)SGA, you could configure all the interfaces in an EtherChannel provided that they have the same MTU. Changing the MTU of an EtherChannel changes the MTU of all member ports. If the MTU of a member port cannot be changed to the new value, that port is suspended (administratively shut down). A port cannot join an EtherChannel if the port has a different MTU. If a member port of an EtherChannel changes MTU, the member port is suspended.

## VLAN Interfaces

If switch ports reside in the same VLAN, either configure all of the switch ports to handle jumbo frames and support the same MTU size, or configure none of them. However, such uniformity of MTU size in the same VLAN is not enforced.

When a VLAN has switch ports with different MTU size, packets received from a port with a larger MTU might be dropped when they are forwarded to a port with a smaller MTU.

If the switch ports in a VLAN have jumbo frames enabled, the corresponding SVI can have jumbo frames enabled. The MTU of an SVI should always be smaller than the smallest MTU among all the switch ports in the VLAN, but this condition is not enforced.

The MTU of a packet is not checked on the ingress side for an SVI; it is checked on the egress side of an SVI. If the MTU of a packet is larger than the MTU of the egress SVI, the packet is sent to the CPU for fragmentation processing. If the “do not fragment” bit is not set, the packet is fragmented. Otherwise, the packet is dropped.

## Configuring MTU Sizes

To configure the MTU size, perform this task:

|        | Command                                                                                                                            | Purpose                                                                       |
|--------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Step 1 | Switch(config)# <b>interface</b> {{vlan vlan_ID}   {{type <sup>1</sup> slot/port}   {port-channel port_channel_number} slot/port}} | Selects the interface to configure.                                           |
| Step 2 | Switch(config-if)# <b>mtu</b> mtu_size<br><br>Switch(config-if)# <b>no mtu</b>                                                     | Configures the MTU size.<br><br>Reverts to the default MTU size (1500 bytes). |
| Step 3 | Switch(config-if)# <b>end</b>                                                                                                      | Exits configuration interface mode.                                           |
| Step 4 | Switch(config)# <b>end</b>                                                                                                         | Exits configuration mode.                                                     |
| Step 5 | Switch# <b>show running-config interface</b> [{fastethernet   gigabitethernet} slot/port]                                          | Verifies the running configuration.                                           |

1. *type* = fastethernet, gigabitethernet, or tengigabitethernet



### Note

When you remove a line card, and then reinsert the card, some or all of the MTU values configured on the ports of that line card may be unconfigured. This occurs if the system wide limit of 32 different MTUs is reached while the card is removed. Upon reinserting the line card, the system attempts to reapply the MTU configuration on the ports. If this attempt fails, the MTU values are set to the default.



### Note

When configuring the MTU size for VLAN interfaces and Layer 3 and Layer 2 Ethernet ports, note that the supported MTU values are from 1500 to 9198 bytes.

This example shows how to configure the MTU size on Gigabit Ethernet port 1/1:

```
switch# conf terminal
switch(config)# interface g1/1
switch(config-if)# mtu 9198
switch(config-if)# end
switch(config)# end
switch# show interface gigabitethernet 1/2
GigabitEthernet1/2 is administratively down, line protocol is down
 Hardware is C6k 1000Mb 802.3, address is 0030.9629.9f88 (bia 0030.9629.9f88)
 MTU 9216 bytes, BW 1000000 Kbit, DLY 10 usec,
<...Output Truncated...>
switch#
```

## Interacting with Baby Giants

The baby giants feature, introduced in Cisco IOS Release 12.1(12c)EW, uses the global command **system mtu size** to set the global baby giant MTU. This feature also allows certain interfaces to support Ethernet payload size of up to 1552 bytes.

Both the **system mtu** command and the per-interface **mtu** command can operate on interfaces that can support jumbo frames, but the per-interface **mtu** command takes precedence.

For example, before setting the per-interface MTU for interface gi1/1, you enter the **system mtu 1550** command to change the MTU for gi1/1 to 1550 bytes. You enter the per-interface **mtu** command to change the MTU for gi1/1 to 9198 bytes. If you change the baby giant MTU to 1540 bytes with the command **system mtu 1540**, the MTU for gi1/1 remains unchanged at 9198 bytes.

## Configuring the Port Debounce Timer



### Note

You can only configure port debounce on 10-Gigabit Ethernet ports.

The port debounce timer suppresses notification of short link-down events. Link-down events that are shorter than the port debounce timer are not notified to Layer 2 or Layer 3 protocols, decreasing traffic loss due to network reconfiguration. You can configure the port debounce timer separately on each LAN port.



### Caution

Enabling the port debounce timer causes a delay in link down detections, resulting in loss of traffic during the debouncing period. This situation might affect the convergence and reconvergence of some Layer 2 and Layer 3 protocols.

To configure the debounce timer on a port, perform this task:

|        | Command                                                       | Purpose                                                              |
|--------|---------------------------------------------------------------|----------------------------------------------------------------------|
| Step 1 | Switch(config)# <b>interface tengigabitethernet slot/port</b> | Selects the port to configure.                                       |
| Step 2 | Switch(config-if)# <b>link debounce [time debounce_time]</b>  | Configures the debounce timer.                                       |
|        | Switch(config-if)# <b>no link debounce</b>                    | By default, debounce is disabled.<br>Reverts to the default setting. |
| Step 3 | Switch# <b>show interfaces debounce</b>                       | Verifies the configuration.                                          |



### Note

The default time is 10ms for E-series supervisor engines and line cards.

When configuring the debounce timer on a port, you can increase the port debounce timer value between 10 milliseconds and 5000 milliseconds on the 10-Gigabit Ethernet ports.

This example shows how to enable the port debounce timer on 10-Gigabit Ethernet port 2/1 and to accept the default value (10 ms):

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
```



```
Switch(config)# interface tenGigabitEthernet 2/1
Switch(config-if)# link debounce
Warning: Enabling debounce feature causes link down detection to be delayed
Switch(config-if)# exit
```

This example shows how to enable the port debounce timer of 5000 ms on 10-Gigabit Ethernet port 2/2 and to verify the setting:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface tenGigabitEthernet 2/2
Switch(config-if)# link debounce time 5000
Warning: Enabling debounce feature causes link down detection to be delayed
Switch(config-if)# end
Switch#
Switch# show interfaces debounce | include enable
Te2/1 enable 10
Te2/2 enable 5000
Switch#
```

## Configuring Auto-MDIX on a Port

When automatic medium-dependent-interface crossover (auto-MDIX) is enabled on an port, the port automatically detects the required cable connection type (straight through or crossover) and configures the connection appropriately. When connecting switches without the auto-MDIX feature, you must use straight-through cables to connect to devices such as servers, workstations, or routers and crossover cables to connect to other switches or repeaters. With auto-MDIX enabled, use either type of cable to connect to other devices; the interface automatically corrects for any incorrect cabling. For more information about cabling requirements, see the hardware installation guide.

Auto-MDIX is enabled by default. When you enable auto-MDIX, you must also set the speed on the port to **auto** so that for the feature to operate correctly. auto-MDIX is supported on copper media ports. It is not supported on fiber media ports.



### Note

The following line cards support Auto-MDIX by default, when port auto-negotiation is enabled: WS-X4424-GB-RJ45, WS-X4448-GB-RJ45, WS-X4548-GB-RJ45 and WS-X4412-2GB-T. You cannot disable them with the **mdix** command.



### Note

The following line cards do not support Auto-MDIX, neither by default nor by CLI: WS-X4548-GB-RJ45V, WS-X4524-GB-RJ45V, WS-X4506-GB-T, WS-X4148-RJ, WS-X4248-RJ21V, WS-X4248-RJ45V, WS-X4224-RJ45V and WS-X4232-GB-RJ.



### Note

The following line cards support Auto-MDIX through the CLI on their copper media ports: WS-X4124-RJ45, WS-X4148-RJ45 (hardware revision 3.0 or higher), and WS-X4232-GB-RJ45 (hardware revision 3.0, or higher), WS-X4920-GE-RJ45, WS-4648-RJ45V+E, WS-X4748-UPOE+E and WS-X4748-RJ45+E (Auto-MDIX support when inline power is disabled on the port).

Table 8-7 shows the link states that results from auto-MDIX settings and correct and incorrect cabling.

**Table 8-7** Link Conditions and auto-MDIX Settings

| Local Side auto-MDIX | Remote Side auto-MDIX | With Correct Cabling | With Incorrect Cabling |
|----------------------|-----------------------|----------------------|------------------------|
| On                   | On                    | Link up              | Link up                |
| On                   | Off                   | Link up              | Link up                |
| Off                  | On                    | Link up              | Link up                |
| Off                  | Off                   | Link up              | Link down              |

To configure auto-MDIX on a port, perform this task:

|               | Command                                              | Purpose                                                                          |
|---------------|------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Step 1</b> | Switch# <b>configure terminal</b>                    | Enters global configuration mode                                                 |
| <b>Step 2</b> | Switch(config)# <b>interface</b> <i>interface-id</i> | Enters interface configuration mode for the physical interface to be configured. |
| <b>Step 3</b> | Switch(config-if)# <b>speed auto</b>                 | Configures the port to autonegotiate speed with the connected device.            |
| <b>Step 4</b> | Switch(config-if)# <b>mdix auto</b>                  | Enables auto-MDIX on the port.                                                   |
| <b>Step 5</b> | Switch(config-if)# <b>end</b>                        | Returns to privileged EXEC mode.                                                 |
| <b>Step 6</b> | Switch# <b>show interfaces</b> <i>interface-id</i>   | Verifies the configuration of the auto-MDIX feature on the interface.            |
| <b>Step 7</b> | Switch# <b>copy running-config startup-config</b>    | (Optional) Saves your entries in the configuration file.                         |

To disable auto-MDIX, use the **no mdix auto** interface configuration command.

This example shows how to enable auto-MDIX on a port:

```
Switch# configure terminal
Switch(config)# interface fastethernet 6/5
Switch(config-if)# speed auto
Switch(config-if)# mdix auto
Switch(config-if)# end
```

## Displaying the Interface Auto-MDIX Configuration

To display the interface speed and duplex mode configuration for an interface, perform this task:

|               | Command                                            | Purpose                                                                                                          |
|---------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Switch> <b>enable</b>                              | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul> |
| <b>Step 2</b> | Switch# <b>show interfaces type slot/interface</b> | Displays the interface auto-MDIX configuration setting and operational state.                                    |

Depending on how the **speed auto** and the **mdix auto** commands are configured on a supported line card interface, the **show interfaces** command displays the following possible auto-MDIX statuses:

Table 8-8 shows the auto-MDIX setting and operational state and the status of auto-MDIX.

**Table 8-8 Auto-MDIX and Operational State**

| Auto-MDIX Setting and Operational State on an Interface | Description                                                                                                                                                                    |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Auto-MDIX on (operational: on)                          | Auto-MDIX is enabled and is fully functioning.                                                                                                                                 |
| Auto-MDIX on (operational: off)                         | Auto-MDIX is enabled on this interface but it is not functioning. To allow auto-MDIX feature to function properly, you must also set the interface speed to be autonegotiated. |
| Auto-MDIX off                                           | Auto-MDIX has been disabled with the <b>no mdix auto</b> command.                                                                                                              |

This example shows how to display the auto-MDIX configuration setting and its operational state on Fast Ethernet interface 6/1:

```
Switch# show interfaces fastethernet 6/1
FastEthernet6/1 is up, line protocol is up (connected)
 Hardware is Fast Ethernet Port, address is 0001.64fe.e5d0 (bia 0001.64fe.e5d0)
 MTU 1500 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, link type is auto, media type is 10/100BaseTX
 input flow-control is unsupported output flow-control is unsupported
 Auto-MDIX on (operational: on)
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input 00:00:16, output never, output hang never
 Last clearing of "show interface" counters never
 Input queue: 0/2000/0/0 (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
 511 packets input, 74464 bytes, 0 no buffer
 Received 511 broadcasts (511 multicasts)
 0 runs, 0 giants, 0 throttles
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
 0 input packets with dribble condition detected
 3552 packets output, 269088 bytes, 0 underruns
 0 output errors, 0 collisions, 0 interface resets
 0 babbles, 0 late collision, 0 deferred
 1 lost carrier, 0 no carrier
 0 output buffer failures, 0 output buffers swapped out
Switch#
```

## Understanding Online Insertion and Removal

The online insertion and removal (OIR) feature supported on the Catalyst 4006 switch with Supervisor Engine III allows you to remove and replace modules while the system is online. You can shut down the module before removal and restart it after insertion without causing other software or interfaces to shut down.

You do not need to enter a command to notify the software that you are going to remove or install a module. The system notifies the supervisor engine that a module has been removed or installed and scans the system for a configuration change. The OIR process may take up to 70 seconds before the newly

installed module is initialized. Each interface type is verified against the system configuration, after which the system runs diagnostics on the new interface. There is no disruption to normal operation during module insertion or removal.

If you remove a module and then replace it, or insert a different module of the same type into the same slot, no change to the system configuration is needed. An interface of a type that has been configured previously is brought online immediately. If you remove a module and insert a module of a different type, the interface(s) on that module is administratively up with the default configuration for that module.

## Online Insertion and Removal on a WS-4500X-32

You must initiate an uplink module removal procedure on a WS-4500X-32 (the Catalyst 4500-X Series Switch) either through a CLI (below) or through the OIR button on the front panel of the uplink.



### Note

Unscheduled uplink module removal is not supported because the C4KX-NM-8 module has hardware communication lines to the baseboard that cannot be unplugged in an online state. Communication must be stopped first.

Before removing the uplink module, you must press the OIR button for 5 seconds, and wait for the OIR LED to turn Green. Removing a module without pressing the OIR button causes the system to reboot to ROMMON with the following console error message:

```
Kernel panic - not syncing: Removing a module from switch causes instability.
Rebooting in 15 seconds...
```



### Note

No special steps are needed for insertion.

With Cisco Release IOS XE 3.3.0SG and IOS 15.1(1)SG, two CLI's are introduced: **hw-module module number start** and **hw-module module number stop**. For the *number* keyword, the only applicable value for WS-C4500 is 2. With Cisco Release IOS XE 3.3.0SG and IOS 15.1(1)SG, the **start** and **stop** commands are only enabled on the uplink module of WS-4500X-32.

For details, please refer to the hardware portion of the documentation library:

[http://www.cisco.com/en/US/products/hw/switches/ps4324/prod\\_installation\\_guides\\_list.html](http://www.cisco.com/en/US/products/hw/switches/ps4324/prod_installation_guides_list.html)

## Shutting down a Module

To shut down a module safely, either enter the **hw-module module stop** command or press the OIR button for 5 seconds.



### Note

The **hw-module module stop** command is enabled only on the uplink modules of the WS-C4500X-32.

The following example shows what happens if a module is up and you enter the **hw-module module stop** command:

```
Switch# hw-module module 2 stop
Proceed with module stop? [confirm]
Switch#
*Feb 5 16:34:37.325: %C4K_IOSMODPORTMAN-6-MODULEOFFLINE: Module 2 is offline
Switch# show module
Chassis Type : WS-C4500X-32
```

Power consumed by backplane : 0 Watts

| Mod | Ports | Card Type                  | Model             | Serial No.  |
|-----|-------|----------------------------|-------------------|-------------|
| 1   | 32    | 4500X-32 10GE (SFP+)       | WS-C4900X-32P-10G | JAE153505E9 |
| 2   | 8     | Module being held in reset | WS-X4908X-10G-TIM | JAE15340C0J |

| M | MAC addresses                    | Hw  | Fw           | Sw      | Status   |
|---|----------------------------------|-----|--------------|---------|----------|
| 1 | 0022.bde2.1061 to 0022.bde2.1080 | 0.2 | 15.0(1r)SG(0 | 0.DEV-0 | Ok       |
| 2 | 0022.bde2.1579 to 0022.bde2.1580 | 0.1 |              |         | In Reset |

Switch#

The following example shows what happens if a module is already stopped and you enter the **hw-module module stop** command:

```
Switch# hw-module module 2 stop
% Module 2 stopped
```

## Booting a Module After if it has been Stopped

To bring up a module that has been stopped using the **hw-module module number stop** command or by pressing the **OIR button**, you either enter the **hw-module module number start** command or physically remove and reinsert.

The following example shows what happens if a module has been stopped and you enter this command:

```
Switch# hw-module module 2 start
Switch#
*Feb 5 16:36:27.352: %C4K_IOSMODPORTMAN-6-MODULEINSERTED: Module 2 is inserted
*Feb 5 16:37:15.902: %C4K_IOSMODPORTMAN-6-MODULEONLINE: Module 2 (WS-X4908X-10G-TIM S/N:
JAE15340C0J Hw: 0.1) is online
Switch# show module
Chassis Type : WS-C4500X-32
```

Power consumed by backplane : 0 Watts

| Mod | Ports | Card Type            | Model             | Serial No.  |
|-----|-------|----------------------|-------------------|-------------|
| 1   | 32    | 4500X-32 10GE (SFP+) | WS-C4900X-32P-10G | JAE153505E9 |
| 2   | 8     | 10GE SFP+            | WS-X4908X-10G-TIM | JAE15340C0J |

| M | MAC addresses                    | Hw  | Fw           | Sw      | Status |
|---|----------------------------------|-----|--------------|---------|--------|
| 1 | 0022.bde2.1061 to 0022.bde2.1080 | 0.2 | 15.0(1r)SG(0 | 0.DEV-0 | Ok     |
| 2 | 0022.bde2.1579 to 0022.bde2.1580 | 0.1 |              |         | Ok     |

Switch#

The following example shows what happens if a module has not been stopped and you enter this command:

```
Switch# hw-module module 2 start
% Module 2 not stopped
```

## Common Scenarios

Table 8-9 lists the common scenarios associated with an OIR on a WS-4500X-32.

**Table 8-9 Common Scenarios for OIR on a WS-4500X-32**

| If you do this or want to do this...                                                       | This happens or you need to do this....                                                                                                                                   |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Insert a new module for the first time.                                                    | The behavior of new module matches that of current linecard.                                                                                                              |
| Pull out an uplink module that was not previously stopped or shut down.                    | The system reboots to ROMMON.                                                                                                                                             |
| Press the OIR button accidentally.                                                         | Press for less than 5 sec and nothing happens.<br>Press for more than 5 sec and OIR is initiated. The linecard moves to the reset state and the OIR LED turns GREEN.      |
| Change your mind after entering the <b>module stop</b> command or pressing the OIR button. | Enter the <b>module start</b> command or perform a physical OIR. Both actions trigger uplink module restart. If the module is not faulty, it is restored to online state. |
| Know if the OIR button has taken effect.                                                   | The OIR LED on the uplink module turns GREEN and the linecard status LED on the uplink module turns off.                                                                  |
| Disable the OIR button and force use of a CLI to initiate an OIR.                          | Cannot be done.                                                                                                                                                           |

## Monitoring and Maintaining the Interface

The following sections describe how to monitor and maintain the interfaces:

- [Monitoring Interface and Controller Status, page 8-46](#)
- [Clearing and Resetting the Interface, page 8-47](#)
- [Shutting Down and Restarting an Interface, page 8-47](#)
- [Configuring Interface Link Status and Trunk Status Events, page 8-48](#)
- [Resetting the Interface to the Default Configuration, page 8-50](#)

### Monitoring Interface and Controller Status

The Cisco IOS software for the Catalyst 4006 switch with Supervisor Engine III contains commands that you can enter at the EXEC prompt to display information about the interface, including the version of the software and the hardware, the controller status, and statistics about the interfaces. The following table lists some of the interface monitoring commands. (You can display the full list of **show** commands by entering the **show ?** command at the EXEC prompt.)

To display information about the interface, enter one of the following commands:

| Command                                                       | Purpose                                                                                                                   |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Switch# <b>show interfaces</b> [ <i>type slot/interface</i> ] | Displays the status and configuration of all interfaces or of a specific interface.                                       |
| Switch# <b>show running-config</b>                            | Displays the configuration currently running in RAM.                                                                      |
| Switch# <b>show protocols</b> [ <i>type slot/interface</i> ]  | Displays the global (system-wide) and interface-specific status of any configured protocol.                               |
| Switch# <b>show version</b>                                   | Displays the hardware configuration, software version, the names and sources of configuration files, and the boot images. |

This example shows how to display the status of Fast Ethernet interface 5/5:

```
Switch# show protocols fastethernet 5/5
FastEthernet5/5 is up, line protocol is up
Switch#
```

## Clearing and Resetting the Interface

To clear the interface counters shown with the **show interfaces** command, enter this command:

| Command                                                      | Purpose                    |
|--------------------------------------------------------------|----------------------------|
| Switch# <b>clear counters</b> [ <i>type slot/interface</i> ] | Clears interface counters. |

This example shows how to clear and reset the counters on Fast Ethernet interface 5/5:

```
Switch# clear counters fastethernet 5/5
Clear "show interface" counters on this interface [confirm] y
Switch#
*Sep 30 08:42:55: %CLEAR-5-COUNTERS: Clear counter on interface FastEthernet5/5
by vty1 (171.69.115.10)
Switch#
```

The **clear counters** command (without any arguments) clears all the current interface counters from all interfaces.



### Note

The **clear counters** command does not clear counters retrieved with SNMP; it clears only those counters displayed with the EXEC **show interfaces** command.

## Shutting Down and Restarting an Interface

You can disable an interface, which disables all functions on the specified interface and marks the interface as unavailable on all monitoring command displays. This information is communicated to other network servers through all dynamic routing protocols. The interface is not mentioned in any routing updates.

To shut down an interface and then restart it, perform this task:

|        | Command                                                                                                                                                                                                                                 | Purpose                                   |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Step 1 | Switch(config)# <b>interface</b> { <b>vlan</b> <i>vlan_ID</i> }  <br>{ <b>fastethernet</b>   <b>gigabitethernet</b>  <br><b>ten</b> <b>gigabitethernet</b> } <i>slot/port</i> }   { <b>port-channel</b><br><i>port_channel_number</i> } | Specifies the interface to be configured. |
| Step 2 | Switch(config-if)# <b>shutdown</b>                                                                                                                                                                                                      | Shuts down the interface.                 |
| Step 3 | Switch(config-if)# <b>no shutdown</b>                                                                                                                                                                                                   | Reenables the interface.                  |

This example shows how to shut down Fast Ethernet interface 5/5:

```
Switch(config)# interface fastethernet 5/5
Switch(config-if)# shutdown
Switch(config-if)#
*Sep 30 08:33:47: %LINK-5-CHANGED: Interface FastEthernet5/5, changed state to a
administratively down
Switch(config-if)#
```

This example shows how to reenabale Fast Ethernet interface 5/5:

```
Switch(config-if)# no shutdown
Switch(config-if)#
*Sep 30 08:36:00: %LINK-3-UPDOWN: Interface FastEthernet5/5, changed state to up
Switch(config-if)#
```

To verify whether an interface is disabled, enter the EXEC **show interfaces** command. An interface that has been shut down appears as “administratively down.”

## Configuring Interface Link Status and Trunk Status Events

You can configure interface link status and trunk status events. On the Catalyst 4500 series switch, the following interface logging event notifications are supported both globally and per interface:

- Enable or disable notification on the interface whenever its data link status is changed.
- Enable or disable notification on the trunk interface whenever its trunking status is changed.

Use the **[no] logging event link-status use-global** command to enable or disable the interface link status event. Use the **[no] logging event trunk-status use-global** command to enable or disable the interface trunk status event.

Each interface link status logging event can be configured in one of the following states:

- **logging event link-status**—Link status logging event is enabled explicitly on the interface regardless of the switch global setting.
- **no logging event link-status**—Link status logging event is disabled explicitly on the interface regardless of the switch global setting.
- **logging event link-status use-global**—Default link status logging event configuration on the interface; its configuration should follow the switch global link status logging event setting.

The interface trunk status logging event can be configured in the same configuration states.



## Configuring Link Status Event Notification for an Interface

To enable or disable a link status logging event, enter one of the following commands:

| Command                                                        | Purpose                                                                 |
|----------------------------------------------------------------|-------------------------------------------------------------------------|
| Switch(config-if)# <b>logging event link-status</b>            | Enables interface link status logging.                                  |
| Switch(config-if)# <b>no logging event link-status</b>         | Disables interface link status logging.                                 |
| Switch(config-if)# <b>logging event link-status use-global</b> | Specifies the global default setting for interface link status logging. |

## Global Settings

You can also provide a global configuration for the corresponding logging event. A global configuration provides default logging settings for all interfaces. The **[no] logging event link-status global** command lets you enable or disable the interface link status logging for the entire switch. The **[no] logging event trunk-status global** command lets you enable/disable interface trunk status logging for the entire switch.

Each interface link status logging event, if not configured at the interface level, uses the following global logging event setting:

- **logging event link-status global**—Link status logging event is enabled, if not configured on the interface.
- **no logging event link-status global**—Link status logging event is disabled, if not configured on the interface.

The interface trunk status logging event has similar global configurations.

## Configuring a Switch Global Link Status Logging Event

To enable or disable the global link status logging event, enter one of the following commands:

| Command                                                       | Purpose                              |
|---------------------------------------------------------------|--------------------------------------|
| Switch(config-if)# <b>logging event link-status global</b>    | Enables global link status logging.  |
| Switch(config-if)# <b>no logging event link-status global</b> | Disables global link status logging. |

## Examples

The following example displays a summary of the operating states for the interface logging event using different combinations of global and interface logging settings:

| global setting | interface setting    | actual logging state |
|----------------|----------------------|----------------------|
| on             | on                   | on                   |
| off            | on                   | on                   |
| on             | off                  | off                  |
| off            | off                  | off                  |
| on             | default (use-global) | on                   |
| off            | default (use-global) | off                  |

The following example displays the configuration and logging message output for link status and trunk status logging events:

```
//
// The global link status and trunk status logging events are enabled.
//
Switch# show running | include logging
show running | include logging
logging event link-status global
logging event trunk-status global
Switch#

//
// The interface link status and trunk status logging settings
// are set to default values, which follow regardless of the global
// setting.
//
Switch# show running interface g1/4
Building configuration...

Current configuration: 97 bytes
!
interface GigabitEthernet1/4
 switchport trunk encapsulation dot1q
 switchport mode trunk
end
Switch#

//
// The trunk status logging messages for the interface are
// displayed whenever the interface trunking status is changed.
// Here we change the other end node's trunking encapsulation
// from dot1q to isl.
//
3d00h: %DTP-5-ILGLCFG: Illegal config(on,isl--on,dot1q) on Gi1/4
3d00h: %DTP-5-ILGLCFG: Illegal config(on,isl--on,dot1q) on Gi1/4
3d00h: %DTP-5-ILGLCFG: Illegal config(on,isl--on,dot1q) on Gi1/4

//
// The link and trunk status logging message for the interface
// are displayed whenever the interface link status is changed.
// Here we do a "shut" and "no shut" on the other end link node.
//
3d00h: %DTP-5-NONTRUNKPORTON: Port Gi1/4 has become non-trunk
3d00h: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/4, changed state to down
3d00h: %LINK-3-UPDOWN: Interface GigabitEthernet1/4, changed state to
down
3d00h: %LINK-3-UPDOWN: Interface GigabitEthernet1/4, changed state to up
3d00h: %DTP-5-TRUNKPORTON: Port Gi1/4 has become dot1q trunk
3d00h: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/4, changed state to up
```

## Resetting the Interface to the Default Configuration

If you have configured an interface with many command lines and you want to clear all the configuration on that interface, use the **default interface** global configuration command, as follows:

```
Switch(config)# default interface fastEthernet 3/5
Interface FastEthernet3/5 set to default configuration
```

This command clears all the configurations and shut down the interface:

```
Switch# show run interface fastethernet 3/5
Building configuration...

Current configuration : 58 bytes
!
interface FastEthernet3/5
 no ip address
 shutdown
end
```

