



# CHAPTER 7

## Configuring Interfaces

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

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### Note

For complete syntax and usage information for the switch commands used in this chapter, look at 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 the command is not found in the Catalyst 4500 Command Reference, it is located in the larger Cisco IOS library. Refer to the *Catalyst 4500 Series Switch Cisco IOS Command Reference* and related publications at this location:

<http://www.cisco.com/en/US/products/ps6350/index.html>

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## About Interface Configuration

By default, all interfaces are enabled. The 10/100-Mbps Ethernet interfaces autonegotiated 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 **gigabithernet** keyword)
  - 10-Gigabit Ethernet (use the **tengigabithernet** 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.

The interfaces on WS-X45-SUP7-E, and WS-X4712-SFP+E support both Gigabit Ethernet SFPs and Ten Gigabit Ethernet SFP+s but are always termed Ten Gigabit Ethernet 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** Adding a space between the interface type and interface number is not needed. 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 will 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.



**Note** On the Supervisor, WS-X45-SUP7-E and the linecard, WS-X4712-SFP+E, the interfaces can support both Gigabit Ethernet SFPs and 10-Gigabit Ethernet SFP+s. For simplicity, these interfaces are always termed 10-Gigabit Ethernet interfaces. All Gigabit Ethernet and 10-Gigabit Ethernet parameters can be configured on these interfaces. However, the actual interface configuration parameters that are valid for an interface depend on which transceiver type (SFP or SFP+) is loaded. When an SFP is loaded, only the Gigabit Ethernet parameters are applicable and the interface behaves exactly like a Gigabit Ethernet port. Similarly, when an SFP+ is loaded, only the 10-Gigabit Ethernet parameters are applicable and the interface behaves exactly like a 10-Gigabit Ethernet port.

- 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 7-25.

## 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, perform this task:

| 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 reenable 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 re-enable 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 you are 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.

## Defining and Using Interface-Range Macros

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

To define an interface-range macro, perform this task:

Table 7-1

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

This example shows how to define an interface-range macro named **enet\_list** to select Fast Ethernet 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, perform this task:

Table 7-2

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

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, perform this task:

Table 7-3

| 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 WS-X4606-X2-E.

To use an SFP+ in an X2 port to obtain 10-Gigabit Ethernet bandwidth, the Catalyst 4500 series switch supports OneX Converter modules. When you plug a OneX Converter 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 Converter 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 Converter module seeproms when an SFP+ in a OneX Converter module is plugged into an X2 port.

## Deploying 10-Gigabit Ethernet or Gigabit Ethernet Ports on WS-X4606-10GE-E

To increase the flexibility of X2 ports on WS-X4606-10GE-E, the Catalyst 4500 switch supports TwinGig Converter modules. When you plug a TwinGig Converter 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 linecard. It also allows you to use Gigabit ports, and then switch to a 10-Gigabit port, when needed.

Topics include:

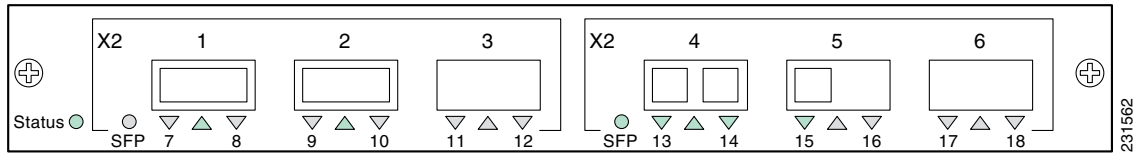
- [Port Numbering TwinGig Convertors, page 7-7](#)
- [Selecting X2/TwinGig Converter Mode, page 7-8](#)

## Port Numbering TwinGig Convertors

When a TwinGig Converter is enabled or disabled, the number and type of ports on the linecard change dynamically. The terminology must reflect this behavior. In Cisco IOS, 10-Gigabit ports are named *TenGigabit* and 1-Gigabit ports are named *Gigabit*. To avoid having two ports named TenGigabit1/1 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 *TenGigabit slot-num/<1-6>*, and the SFP ports are named *Gigabit slot-num/<7-18>*.

**Figure 7-1 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.



**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 will 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.

## Selecting X2/TwinGig Converter Mode

The default configuration mode is X2. So, if you plan to deploy 10-Gigabit interfaces, you don’t need to configure anything. However, if you want to deploy Gigabit interfaces (that is, use TwinGig Convertors), 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**

For a 10-Gigabit port that accepts a HAMM, you must place it into 1-Gigabit mode instead of 10-Gigabit mode.

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

```
Switch# show hw-module module 5 port-group
Module Port-group Active Inactive
-----
5      1      Gi5/3-6          Te5/1-2
```

Instead, if the port is set to the default, 10-Gigabit mode, an output similar to the following displays:

```
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       |
|--------|------|------------|------|--------|-------|------------|
| Tel/1  |      | notconnect | 1    | full   | 10G   | 10GBase-LR |
| Tel/2  |      | connected  | 1    | full   | 10G   | 10GBase-LR |
| Tel/3  |      | notconnect | 1    | full   | 10G   | No X2      |
| Tel/4  |      | notconnect | 1    | full   | 10G   | No X2      |
| Tel/5  |      | notconnect | 1    | full   | 10G   | No X2      |
| Tel/6  |      | notconnect | 1    | full   | 10G   | No X2      |
| Gi1/7  |      | inactive   | 1    | full   | 1000  | No Gbic    |
| Gi1/8  |      | inactive   | 1    | full   | 1000  | No Gbic    |
| Gi1/9  |      | inactive   | 1    | full   | 1000  | No Gbic    |
| Gi1/10 |      | inactive   | 1    | full   | 1000  | No Gbic    |
| Gi1/11 |      | inactive   | 1    | full   | 1000  | No Gbic    |
| Gi1/12 |      | inactive   | 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    |

```
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 TenGigabit 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    |
|--------|------|------------|------|--------|-------|---------|
| Tel/1  |      | inactive   | 1    | full   | 10G   | No X2   |
| Tel/2  |      | inactive   | 1    | full   | 10G   | No X2   |
| Tel/3  |      | inactive   | 1    | full   | 10G   | No X2   |
| Tel/4  |      | notconnect | 1    | full   | 10G   | No X2   |
| Tel/5  |      | notconnect | 1    | full   | 10G   | No X2   |
| Tel/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 |

## Internal Management Port and Supervisor Engine 7-E and Supervisor Engine 7L-E

The Internal Management Port is not supported on WS-X45-SUP7-E and WS-X45-SUP-7L-E. The configuration for the internal management port always appears in the running configuration in shutdown state. The configuration cannot be changed to the no shut state. One of the front panel ports on the WS-X45-SUP-7-E and WS-X45-SUP-7L-E or on a linecard in the chassis can be configured and used as a management port.

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

Please note the following:

- When you use WS-X45-SUP-7-E in RPR or SSO mode, only the first two uplinks on each supervisor engine are available. The second two uplinks are unavailable.

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

Supervisor Engine 7L-E (WS-X45-SUP-7L-E) has two uplink modes: One-Gigabit and Ten-Gigabit. 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 both Supervisor Engine 7-E and Supervisor Engine 7L-E.

In general, observe the following:

- In Redundant Supervisor Mode, ports 3 and 4 on both supervisor engines are not usable.
- The total bandwidth of the connections on a Supervisor Engine 7-E is less than 48Gbps.

## 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 7-1).

**Table 7-1 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 thru 4.

## Redundant Supervisor Mode

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

Select the Ten-Gigabit operation through the command line interface.



**Note**

There is no redundancy mode support for uplink ports 3 and 4 on a supervisor engine.

**Table 7-2 Uplink Options for Redundant Supervisor Mode**

| Active Supervisor Uplink Ports                                  |     |    |    | Standby Supervisor Uplink Ports |     |    |    | Speeds Achievable with this Combination of Pluggables |
|-----------------------------------------------------------------|-----|----|----|---------------------------------|-----|----|----|-------------------------------------------------------|
| A1                                                              | A2  | A3 | A4 | B1                              | B2  | B3 | B4 |                                                       |
| 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 subsections describe optional procedures:

- [Configuring Ethernet Interface Speed and Duplex Mode, page 7-12](#)
- [Configuring Flow Control, page 7-15](#)
- [Configuring Jumbo Frame Support, page 7-18](#)
- [Interacting with Baby Giants, page 7-21](#)
- [Configuring the Port Debounce Timer, page 7-21](#)
- [Configuring auto-MDIX on a Port, page 7-22](#)

## Configuring Ethernet Interface Speed and Duplex Mode

- [Speed and Duplex Mode Configuration Guidelines, page 7-12](#)
- [Setting the Interface Speed, page 7-13](#)
- [Setting the Interface Duplex Mode, page 7-14](#)
- [Displaying the Interface Speed and Duplex Mode Configuration, page 7-14](#)
- [Adding a Description for an Interface, page 7-15](#)

### Speed and Duplex Mode Configuration Guidelines

**Note**

You do not configure the client device for autonegotiation. Rather, 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 4500 series switch 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.

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

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**

This is analogous to specifying **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 will result 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.

## Setting the Interface Duplex Mode

**Note**

When the interface is set to 1000 Mbps, 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, perform this task:

| 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#

```

## 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 Tenggigabit 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 Tenggigabit 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><br><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><br>{ <b>receive</b>   <b>send</b> } { <b>off</b>   <b>on</b>  <br><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 flowcontrol** 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-(1p3q1t, 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

```

**Note**

Although all interfaces are termed 10-Gigabit interfaces on WS-X45-SUP7+E and WS-X4712-SFP+E, if an interface has an SFP, the interface is treated as a Gigabit Ethernet interface.

## Configuring Jumbo Frame Support

These subsections describe jumbo frame support:

- [Ports and Modules that Support Jumbo Frames, page 7-18](#)
- [Jumbo Frame Support, page 7-18](#)
- [Configuring MTU Sizes, page 7-20](#)

### Ports and Modules that Support Jumbo Frames

The following ports and modules support jumbo frames:

- Supervisor uplink 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
- WS-X4606-X2-E
- WS-X4648-RJ45-E
- WS-X4648-RJ45V+E
- WS-X4648-RJ45V-E
- WS-X4712-SFP+E
- WS-X4748-UPOE+E
- WS-X4748-RJ45-E
- WS-X4748-RJ45V+E

### Jumbo Frame Support

These sections describe jumbo frame support:

- [Maximum Transmission Units, page 7-19](#)
- [Jumbo Frame Support Overview, page 7-19](#)
- [Ethernet Ports, page 7-19](#)
- [VLAN Interfaces, page 7-20](#)

## 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. So, 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) will be 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 will only allow configuration to proceed if the new MTU size has previously been configured on some interface. Otherwise, an error message will be displayed and the default MTU size will be 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 7-19](#)
- [Layer 3 and Layer 2 EtherChannels, page 7-20](#)

### Ethernet Port Overview

Configuring a nondefault MTU size on certain Ethernet ports limits the size of ingress packets. The MTU does not impact the egress packets.

### Layer 3 and Layer 2 EtherChannels

You can 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 will be 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>Switch(config-if)# <b>no mtu</b>                                                         | Configures the MTU size.<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 linecard, and then reinsert the card, some or all of the MTU values configured on the ports of that linecard may be unconfigured. This will happen if the system wide limit of 32 different MTUs is reached while the card is removed. Upon reinserting the linecard, 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 gi1/1
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#
```

For details on how to configure IP MTU size, refer to [Configuring MTU Sizes, page 7-20](#).

## Interacting with Baby Giants

The baby giants feature 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 issue the **system mtu 1550** command to change the MTU for gi1/1 to 1550 bytes. Next, you issue the per-interface **mtu** command to change the MTU for gi1/1 to 9198 bytes. Now, 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

The port debounce timer delays notification of a link change, which can decrease traffic loss due to network reconfiguration. You can configure the port debounce timer separately on each LAN port.



### Note

You can only configure Port Debounce on 10GE ports.



### Caution

Enabling the port debounce timer causes link up and link down detections to be delayed, 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>                    | Reverts to the default setting. |
| Step 3 | Switch# <b>show interfaces debounce</b>                       | Verifies the configuration.     |

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

**Note**

By default, debounce is disabled. If you configure debounce without a time, the value is set at 100ms.

This example shows how to enable the port debounce timer on TenGigabit 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 TenGigabit 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, you can use either type of cable to connect to other devices, and 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 linecards 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 linecards 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 linecards 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 and WS-4648-RJ45V+E (Auto-MDIX support when inline power is disabled on the port).

Table 7-3 shows the link states that results from auto-MDIX settings and correct and incorrect cabling.

**Table 7-3 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 the following task:

|               | Command                                           | Purpose                                                                          |
|---------------|---------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Step 1</b> | Switch# <b>configure terminal</b>                 | Enters global configuration mode                                                 |
| <b>Step 2</b> | Switch(config)# <b>interface interface-id</b>     | 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 interface-id</b>       | 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                                                                                                            |
|--------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Step 1 | Switch> <b>enable</b>                              | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul> |
| Step 2 | 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 linecard interface, the **show interfaces** command displays the following possible auto-MDIX statuses:

Table 7-4 shows the auto-MDIX setting and operational state and the status of auto-MDIX.

**Table 7-4 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 runts, 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 4500 series switch 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 newly installed module is initialized, and each interface type is verified against the system configuration; then 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 will be brought online immediately. If you remove a module and insert a module of a different type, the interface(s) on that module will be administratively up with the default configuration for that module.

## Monitoring and Maintaining the Interface

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

- [Monitoring Interface and Controller Status, page 7-25](#)
- [Clearing and Resetting the Interface, page 7-26](#)
- [Shutting Down and Restarting an Interface, page 7-26](#)
- [Configuring Interface Link Status and Trunk Status Events, page 7-27](#)
- [Resetting the Interface to the Default Configuration, page 7-29](#)

## Monitoring Interface and Controller Status

The Cisco IOS software for the Catalyst 4500 series switch 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.) These commands are fully described in the *Interface Command Reference*.

To display information about the interface, perform this task:

|        | Command                                                       | Purpose                                                                                                                   |
|--------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Switch# <b>show interfaces</b> [ <i>type slot/interface</i> ] | Displays the status and configuration of all interfaces or of a specific interface.                                       |
| Step 2 | Switch# <b>show running-config</b>                            | Displays the configuration currently running in RAM.                                                                      |
| Step 3 | Switch# <b>show protocols</b> [ <i>type slot/interface</i> ]  | Displays the global (system-wide) and interface-specific status of any configured protocol.                               |
| Step 4 | 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 the following 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 will not be 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> {vlan vlan_ID}   {{fastethernet   gigabitethernet   tengigabitethernet} slot/port}   {port-channel port_channel_number} | 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 will appear 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/disable notification on the interface whenever its data link status is changed.
- Enable/disable notification on the trunk interface whenever its trunking status is changed.

Use the **[no] logging event link-status [use-global]** command to enable/disable the interface link status event. Use the **[no] logging event trunk-status [use-global]** command to enable/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** - This is the 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/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/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, will use 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/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. |

## Result

The following example displays a summary of the operating states for the interface logging event under 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 a interface with many command lines and you want to clear all the configuration on that interface, you can 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 will clear all the configurations and shutdown the interface:

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

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