



## Configuring the Switch Interfaces

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This chapter describes the types of interfaces on a Catalyst 2950 or Catalyst 2955 switch and how to configure them. The chapter has these sections:

- [Understanding Interface Types, page 11-1](#)
- [Using the Interface Command, page 11-4](#)
- [Configuring Ethernet Interfaces, page 11-9](#)
- [Monitoring and Maintaining the Interfaces, page 11-16](#)



**Note**

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For complete syntax and usage information for the commands used in this chapter, refer to the switch command reference for this release and the online *Cisco IOS Interface Command Reference for Cisco IOS Release 12.1*.

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## Understanding Interface Types

This section describes the different types of interfaces supported by the switch with references to chapters that contain more detailed information about configuring these interface types. The rest of the chapter describes configuration procedures for switch ports.

Switch ports are Layer 2-only interfaces associated with a physical port. They are used for managing the physical interface and associated Layer 2 protocols and do not handle routing or bridging. A switch port can be an access port or a trunk port.

You can configure a port as an access port or trunk port or let the Dynamic Trunking Protocol (DTP) operate on a per-port basis to determine if a switch port should be an access port or a trunk port by negotiating with the port on the other end of the link.

Configure switch ports by using the **switchport** interface configuration commands. For detailed information about configuring access port and trunk port characteristics, see [Chapter 17, “Configuring VLANs.”](#)



**Note**

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The physical switch ports can be 10/100 Ethernet ports, 10/100/1000 Ethernet ports, 100BASE-FX ports, 1000BASE-SX ports, Long-Reach Ethernet (LRE) ports, Gigabit Interface Converter (GBIC) module ports, and small form-factor pluggable (SFP)-module ports. For more information, refer to the switch hardware installation guide.

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These sections describes these types of interfaces:

- [Access Ports, page 11-2](#)
- [Trunk Ports, page 11-2](#)
- [Port-Based VLANs, page 11-3](#)
- [EtherChannel Port Groups, page 11-3](#)
- [Connecting Interfaces, page 11-4](#)

## Access Ports

An access port belongs to and carries the traffic of only one VLAN (unless it is configured as a voice VLAN port). Traffic is received and sent in native formats with no VLAN tagging. Traffic arriving on an access port is assumed to belong to the VLAN assigned to the port. If an access port receives an 802.1P- or 802.1Q-tagged packet for the VLAN assigned to the port, the packet is forwarded. If the port receives an 802.1P- or 802.1Q-tagged packet for another VLAN, the packet is dropped, the source address is not learned, and the frame is counted in the *No destination* statistic.

The Catalyst 2950 or Catalyst 2955 switch does not support ISL-tagged packets. If the switch receives an ISL-tagged packet, the packet is flooded in the native VLAN of the port on which it was received because the MAC destination address in the ISL-tagged packet is a multicast address.

Two types of access ports are supported:

- Static access ports are manually assigned to a VLAN.
- VLAN membership of dynamic access ports is learned through incoming packets. By default, a dynamic access port is a member of no VLAN, and forwarding to and from the port is enabled only when the VLAN membership of the port is discovered. Dynamic access ports on the switch are assigned to a VLAN by a VLAN Membership Policy Server (VMPS). The VMPS can be a Catalyst 6000 series switch; the Catalyst 2950 or Catalyst 2955 switch does not support the function of a VMPS.

You can also configure an access port with an attached Cisco IP Phone to use one VLAN for voice traffic and another VLAN for data traffic from a device attached to the phone. For more information about voice VLAN ports, see [Chapter 17, “Configuring VLANs.”](#)

## Trunk Ports

A trunk port carries the traffic of multiple VLANs and by default is a member of all VLANs in the VLAN database. Only IEEE 802.1Q trunk ports are supported. An IEEE 802.1Q trunk port supports simultaneous tagged and untagged traffic. An 802.1Q trunk port is assigned a default Port VLAN ID (PVID), and all untagged traffic travels on the port default PVID. All untagged traffic and tagged traffic with a NULL VLAN ID are assumed to belong to the port default PVID. A packet with a VLAN ID equal to the outgoing port default PVID is sent untagged. All other traffic is sent with a VLAN tag.

Although by default, a trunk port is a member of every VLAN known to the VTP, you can limit VLAN membership by configuring an allowed list of VLANs for each trunk port. The list of allowed VLANs does not affect any other port but the associated trunk port. By default, all possible VLANs (VLAN ID 1 to 1005 when the standard software image [SI] is installed or VLAN ID 1 to 4094 when the enhanced software image [EI] is installed) are in the allowed list. A trunk port can only become a member of a VLAN if VTP knows of the VLAN and the VLAN is in the enabled state. If VTP learns of a new, enabled VLAN and the VLAN is in the allowed list for a trunk port, the trunk port automatically becomes a

member of that VLAN and traffic is forwarded to and from the trunk port for that VLAN. If VTP learns of a new, enabled VLAN that is not in the allowed list for a trunk port, the port does not become a member of the VLAN, and no traffic for the VLAN is forwarded to or from the port.

For more information about trunk ports, see [Chapter 17, “Configuring VLANs.”](#)

## Port-Based VLANs

A VLAN is a switched network that is logically segmented by function, team, or application, without regard to the physical location of the users. For more information about VLANs, see [Chapter 17, “Configuring VLANs.”](#) Packets received on a port are forwarded only to ports that belong to the same VLAN as the receiving port. Network devices in different VLANs cannot communicate with one another without a Layer 3 device to route traffic between the VLANs.

VLAN partitions provide hard firewalls for traffic in the VLAN, and each VLAN has its own MAC address table. A VLAN comes into existence when a local port is configured to be associated with the VLAN, when the VLAN Trunking Protocol (VTP) learns of its existence from a neighbor on a trunk, or when a user creates a VLAN.

To configure normal-range VLANs (VLAN IDs 1 to 1005), use the **vlan *vlan-id*** global configuration command to enter config-vlan mode or the **vlan database** privileged EXEC command to enter VLAN configuration mode. The VLAN configurations for VLAN IDs 1 to 1005 are saved in the VLAN database. To configure extended-range VLANs (VLAN IDs 1006 to 4094) when the EI is installed, you must use config-vlan mode with VTP mode set to transparent. Extended-range VLANs are not added to the VLAN database. When VTP mode is transparent, the VTP and VLAN configuration is saved in the switch running configuration, and you can save it in the switch startup configuration file by entering the **copy running-config startup-config** privileged EXEC command.

Add ports to a VLAN by using the **switchport** interface configuration commands:

- Identify the interface.
- For a trunk port, set trunk characteristics, and if desired, define the VLANs to which it can belong.
- For an access port, set and define the VLAN to which it belongs.

## EtherChannel Port Groups

EtherChannel port groups provide the ability to treat multiple switch ports as one switch port. These port groups act as a single logical port for high-bandwidth connections between switches or between switches and servers. An EtherChannel balances the traffic load across the links in the channel. If a link within the EtherChannel fails, traffic previously carried over the failed link changes to the remaining links. You can group multiple trunk ports into one logical trunk port or group multiple access ports into one logical access port. Most protocols operate over either single ports or aggregated switch ports and do not recognize the physical ports within the port group. Exceptions are the DTP, the Cisco Discovery Protocol (CDP), the Port Aggregation Protocol (PAgP), and Link Aggregation Control Protocol (LACP) which operate only on physical ports.

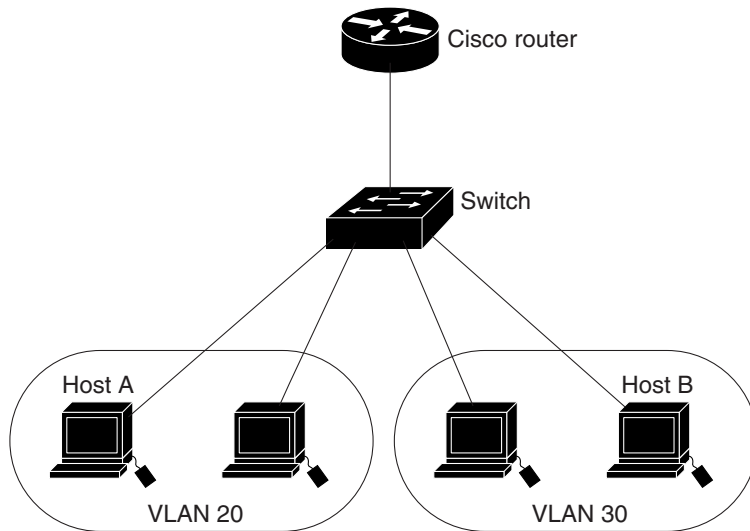
When you configure an EtherChannel, you create a port-channel logical interface and assign an interface to the EtherChannel. For Layer 2 interfaces, the logical interface is dynamically created. You manually assign an interface to the EtherChannel by using the **channel-group** interface configuration command. This command binds the physical and logical ports together. For more information, see [Chapter 31, “Configuring EtherChannels.”](#)

## Connecting Interfaces

Devices within a single VLAN can communicate directly through any switch. Ports in different VLANs cannot exchange data without going through a routing device or routed interface.

With a standard Layer 2 switch, ports in different VLANs have to exchange information through a router. In the configuration shown in [Figure 11-1](#), when Host A in VLAN 20 sends data to Host B in VLAN 30, it must go from Host A to the switch, to the router, back to the switch, and then to Host B.

**Figure 11-1** Connecting VLANs with Layer 2 Switches



## Using the Interface Command

To configure a physical interface (port), use the **interface** global configuration command to enter interface configuration mode and to specify the interface type, slot, and number.

- Type—Fast Ethernet (fastethernet or fa) for 10/100 Ethernet, Gigabit Ethernet (gigabitethernet or gi), or LRE (longreachethernet or lo)
- Slot—The slot number on the switch (always 0 on this switch).
- Port number—The interface number on the switch. The port numbers always begin at 1, starting at the left when facing the front of the switch, for example, fastethernet 0/1, fastethernet 0/2. If there is more than one media type (for example, 10/100 ports and Gigabit Ethernet ports), the port number starts again with the second media: gigabitethernet 0/1, gigabitethernet 0/2.

You can identify physical interfaces by physically checking the interface location on the switch. You can also use the Cisco IOS **show** privileged EXEC commands to display information about a specific interface or all the interfaces on the switch. The remainder of this chapter primarily provides physical interface configuration procedures.

This section describes how to configure all types of interfaces and how to configure a range of interfaces:

- [Procedures for Configuring Interfaces, page 11-5](#)
- [Configuring a Range of Interfaces, page 11-6](#)
- [Configuring and Using Interface-Range Macros, page 11-8](#)

## Procedures for Configuring Interfaces

These general instructions apply to all interface configuration processes.

- Step 1** Enter the **configure terminal** command at the privileged EXEC prompt:

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

- Step 2** Enter the **interface** global configuration command. Identify the interface type and the number of the connector. In this example, Gigabit Ethernet interface 0/1 is selected:

```
Switch(config)# interface gigabitethernet0/1  
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 **gigabitethernet 0/1**, **gigabitethernet0/1**, **gi 0/1**, or **gi0/1**.

- Step 3** 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 when you enter another interface command or enter **end** to return to privileged EXEC mode.

You can also configure a range of interfaces by using the **interface range** or **interface range macro** global configuration commands. Interfaces configured in a range must be the same type and must be configured with the same feature options.

- Step 4** After you configure an interface, verify its status by using the **show** privileged EXEC commands listed in the [“Monitoring and Maintaining the Interfaces” section on page 11-16](#).

Enter the **show interfaces** privileged EXEC command to see a list of all interfaces on or configured for the switch. A report is provided for each interface that the device supports or for the specified interface:

```
Switch# show interfaces  
Vlan1 is up, line protocol is up  
  Hardware is EtherSVI, address is 0000.0000.0000 (bia 0000.0000.00)  
  Internet address is 10.1.1.64/24  
  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 00:00:35, output 2d14h, output hang never  
  Last clearing of "show interface" counters never  
  Queueing strategy: fifo  
  Output queue 0/40, 1 drops; input queue 0/75, 0 drops  
  5 minute input rate 0 bits/sec, 0 packets/sec  
  5 minute output rate 0 bits/sec, 0 packets/sec  
    264251 packets input, 163850228 bytes, 0 no buffer  
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles  
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored  
    380 packets output, 26796 bytes, 0 underruns  
    0 output errors, 0 interface resets  
    0 output buffer failures, 0 output buffers swapped out
```

```

FastEthernet0/1 is up, line protocol is down
  Hardware is Fast Ethernet, address is 0000.0000.0001 (bia 0000.00
  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)
  Auto-duplex, Auto-speed
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 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, 2 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out

<output truncated>

```

## Configuring a Range of Interfaces

You can use the **interface range** global configuration command to configure multiple interfaces with the same configuration parameters. When you enter the interface-range configuration mode, all command parameters that you enter are attributed to all interfaces within that range until you exit this mode.

Beginning in privileged EXEC mode, follow these steps to configure a range of interfaces with the same parameters:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface range</b> { <i>port-range</i>   <b>macro</b> <i>macro_name</i> }	Enter interface-range configuration mode by entering the range of interfaces (VLANs or physical ports) to be configured. <ul style="list-style-type: none"> <li>You can use the <b>interface range</b> command to configure up to five port ranges or a previously defined macro.</li> <li>The <b>macro</b> variable is explained in the “<a href="#">Configuring and Using Interface-Range Macros</a>” section on page 11-8.</li> <li>Each comma-separated <i>port-range</i> must consist of the same port type. You do not need to enter spaces before or after the comma.</li> <li>When you define a range, the space between the first port and the hyphen is required.</li> </ul>
Step 3		You can now use the normal configuration commands to apply the configuration parameters to all interfaces in the range.
Step 4	<b>end</b>	Return to privileged EXEC mode.

	Command	Purpose
Step 5	<code>show interfaces [interface-id]</code>	Verify the configuration of the interfaces in the range.
Step 6	<code>copy running-config startup-config</code>	(Optional) Save your entries in the configuration file.

When using the **interface range** global configuration command, note these guidelines:

- Valid entries for *port-range*:
  - **vlan** *vlan-ID - vlan-ID*, where VLAN ID is from 1 to 1005 with the SI installed or 1 to 4094 with the EI installed
  - **fastethernet** slot/{*first port*} - {*last port*}, where slot is **0**
  - **gigabitethernet** slot/{*first port*} - {*last port*}, where slot is **0**
  - **longreachethernet** slot/{*first port*} - {*last port*}, where slot is **0**
  - **port-channel** *port-channel-number - port-channel-number*, where *port-channel-number* is from 1 to 6
- You must add a space between the interface numbers and the hyphen when using the **interface range** command. For example, the command **interface range fastethernet 0/1 - 5** is a valid range; the command **interface range fastethernet 0/1-5** is not a valid range.
- The **interface range** command works only with VLAN interfaces that have been configured with the **interface vlan** command (the **show running-config** privileged EXEC command output shows the configured VLAN interfaces). VLAN interfaces that do not appear by using the **show running-config** command cannot be used with the **interface range** command.
- All interfaces in a range must be the same type; that is, all Fast Ethernet ports, all Gigabit Ethernet ports, all EtherChannel ports, or VLAN interfaces.

This example shows how to use the **interface range** global configuration command to enable Fast Ethernet interfaces 0/1 to 0/5:

```
Switch# configure terminal
Switch(config)# interface range fastethernet0/1 - 5
Switch(config-if-range)# no shutdown
Switch(config-if-range)#
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet0/2, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet0/3, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet0/4, changed state to up
*Oct 6 08:24:35: %LINK-3-UPDOWN: Interface FastEthernet0/5, changed state to up
*Oct 6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/05,
changed state to up
*Oct 6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed
state to up
*Oct 6 08:24:36: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed
state to up
```

This example shows how to use a comma to add different interface type strings to the range to enable all Fast Ethernet interfaces in the range 0/1 to 0/3 and Gigabit Ethernet interfaces 0/1 and 0/2:

```
Switch# configure terminal
Switch(config)# interface range fastethernet0/1 - 3, gigabitethernet0/1 - 2
Switch(config-if-range)# no shutdown
Switch(config-if-range)#
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet0/2, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface FastEthernet0/3, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Oct 6 08:29:28: %LINK-3-UPDOWN: Interface GigabitEthernet0/2, changed state to up
```

```
*Oct 6 08:29:29: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/ 1,
changed state to up
*Oct 6 08:29:29: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/ 2,
changed state to up
*Oct 6 08:29:29: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/ 3,
changed state to up
```

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

## Configuring and Using Interface-Range Macros

You can create 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** global configuration command string, you must use the **define interface-range** global configuration command to define the macro.

Beginning in privileged EXEC mode, follow these steps to define an interface-range macro:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>define interface-range</b> <i>macro_name</i> <i>interface-range</i>	Define the interface-range macro, and save it in NVRAM. <ul style="list-style-type: none"> <li>The <i>macro_name</i> is a 32-character maximum character string.</li> <li>A macro can contain up to five comma-separated interface ranges. You do not need to enter spaces before or after the comma.</li> <li>Each <i>interface-range</i> must consist of the same port type.</li> </ul>
Step 3	<b>interface range macro</b> <i>macro_name</i>	Select the interface range to be configured by using the values saved in the interface-range macro called <i>macro_name</i> .  You can now use the normal configuration commands to apply the configuration to all interfaces in the defined macro.
Step 4	<b>end</b>	Return to privileged EXEC mode.
Step 5	<b>show running-config   include define</b>	Show the defined interface-range macro configuration.
Step 6	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

Use the **no define interface-range** *macro\_name* global configuration command to delete a macro.

When using the **define interface-range** global configuration command, note these guidelines:

- Valid entries for *interface-range*:
  - vlan** *vlan-ID* - *vlan-ID*, where VLAN ID is from 1 to 1005 with the SI installed or 1 to 4094 with the EI installed
  - fastethernet** slot/{*first port*} - {*last port*}, where slot is **0**
  - gigabitethernet** slot/{*first port*} - {*last port*}, where slot is **0**

- **longreachethernet** slot/{*first port*} - {*last port*}, where slot is 0
- **port-channel** *port-channel-number* - *port-channel-number*, where *port-channel-number* is from 1 to 6.
- You must add a space between the interface numbers and the hyphen when entering an *interface-range*. For example, **fastethernet 0/1 - 5** is a valid range; **fastethernet 0/1-5** is not a valid range.
- The VLAN interfaces must have been configured with the **interface vlan** command. The **show running-config** privileged EXEC command output shows the configured VLAN interfaces. VLAN interfaces that do not appear by using the **show running-config** command cannot be used as *interface-ranges*.
- All interfaces in a range must be the same type; that is, all Fast Ethernet ports, all Gigabit Ethernet ports, all EtherChannel ports, or all VLANs, but you can combine multiple interface types in a macro.

This example shows how to define an interface-range macro named *enet\_list* to select Fast Ethernet ports 1 to 4 and to verify the macro configuration:

```
Switch# configure terminal
Switch(config)# define interface-range enet_list fastethernet0/1 - 4
Switch(config)# end
Switch# show running-config | include define
define interface-range enet_list FastEthernet0/1 - 4
```

This example shows how to create a multiple-interface macro named *macro1*:

```
Switch# configure terminal
Switch(config)# define interface-range macro1 gigabitethernet0/1 - 2, fastethernet0/5 - 7
Switch(config)# end
Switch#
```

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

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

This example shows how to delete the interface-range macro *enet\_list* and to verify that it has been deleted.

```
Switch# configure terminal
Switch(config)# no define interface-range enet_list
Switch# show run | include define
```

## Configuring Ethernet Interfaces

The switch supports these interface types:

- Physical ports—Switch ports, including access and trunk ports
- VLANs—Switch virtual interfaces (SVIs)
- Port-channels—EtherChannel of interfaces

These sections describe the default interface configuration and the optional features that you can configure on most physical interfaces:

- [Default Ethernet Interface Configuration, page 11-10](#)
- [Configuring Interface Speed and Duplex Mode, page 11-11](#)
- [Configuring Media Types for Gigabit Ethernet Interfaces on LRE Switches, page 11-14](#)
- [Configuring IEEE 802.3X Flow Control on Gigabit Ethernet Ports, page 11-14](#)
- [Adding a Description for an Interface, page 11-16](#)

## Default Ethernet Interface Configuration

[Table 11-1](#) shows the Ethernet interface default configuration. For more details on the VLAN parameters listed in the table, see [Chapter 17, “Configuring VLANs.”](#) For details on controlling traffic to the port, see [Chapter 22, “Configuring Port-Based Traffic Control.”](#)

**Table 11-1 Default Ethernet Interface Configuration**

Feature	Default Setting
Operating mode	Layer 2.
Allowed VLAN range	VLANs 1 to 1005 with the SI installed or 1 to 4094 with the EI installed.
Default VLAN (for access ports)	VLAN 1.
Native VLAN (for 802.1Q trunks)	VLAN 1.
VLAN trunking	Switchport mode dynamic desirable (supports DTP).
Port enable state	All ports are enabled.
Port description	None defined.
Speed	Autonegotiate.
Duplex mode	Autonegotiate.
Flow control	Flow control is set to <i>off</i> for <b>receive</b> and <i>desired</i> for <b>send</b> for Gigabit Ethernet ports.
EtherChannel (PAgP) and Link Aggregation Control Protocol (LACP)	Disabled on all Ethernet ports. See <a href="#">Chapter 31, “Configuring EtherChannels.”</a>
Port blocking (unknown multicast and unknown unicast traffic) <sup>1</sup>	Disabled (not blocked). See the <a href="#">“Configuring Port Blocking” section on page 22-5.</a>
Broadcast, multicast, and unicast storm control	Disabled. See the <a href="#">“Default Storm Control Configuration” section on page 22-2.</a>
Protected port	Disabled. See the <a href="#">“Configuring Protected Ports” section on page 22-4.</a>
Port security	Disabled. See the <a href="#">“Default Port Security Configuration” section on page 22-9.</a>
Port Fast	Disabled.
Media Type <sup>1</sup>	SFP module preferred.

1. Available only on the Catalyst 2950 LRE switches.

## Configuring Interface Speed and Duplex Mode

The 10/100 Ethernet interfaces on a non-LRE switch operate in 10 or 100 Mbps and in either full- or half-duplex mode. The 10/100/1000 Ethernet interfaces on Catalyst 2950 LRE, Catalyst 2950T-24, Catalyst 2950T-48-SI, and Catalyst 2955T-24 switches operate at 10 or 100 Mbps in either full- or half-duplex mode or at 1000 Mbps only in full-duplex mode. The fiber-optic SFP-module ports on the LRE switch operate only at 1000 Mbps in full-duplex mode.

In full-duplex mode, two stations can send and receive at the same time. When packets can flow in both directions simultaneously, effective Ethernet bandwidth doubles to 20 Mbps for 10-Mbps interfaces, to 200 Mbps for Fast Ethernet interfaces, and to 2 Gbps for Gigabit Ethernet interfaces. Full-duplex communication is often an effective solution to collisions, which are major constrictions in Ethernet networks. Normally, 10-Mbps ports operate in half-duplex mode, which means that stations can either receive or send.

You can configure interface speed on Fast Ethernet (10/100-Mbps), Gigabit Ethernet (10/100/1000-Mbps), and LRE interfaces. You cannot configure speed on the 100BASE-FX, 1000BASE-SX, GBIC-module, and SFP-module interfaces.

You can configure duplex mode on any Fast Ethernet interfaces that are not set to autonegotiate. You can configure duplex mode on the 10/100/1000 ports on the Catalyst 2950 LRE, Catalyst 2950T-24, Catalyst 2950T-48-SI, and Catalyst 2955T-24 switches but cannot configure duplex mode on these interfaces:

- 100BASE-FX ports on the Catalyst 2950C-24 switch
- 1000BASE-SX ports on the Catalyst 2950SX-24 switch
- 1000BASE-SX ports on the Catalyst 2950SX-48-SI switch
- GBIC ports
- Fiber-optic SFP-module ports on the Catalyst 2950 LRE switch



### Note

You cannot configure speed or duplex mode on GBIC ports, but for certain types of GBICs, you can configure speed to not negotiate (**nonegotiate**) if connected to a device that does not support autonegotiation.

These sections describe how to configure the interface speed and duplex mode:

- [Configuration Guidelines, page 11-11](#)
- [Setting the Interface Speed and Duplex Parameters on a Non-LRE Switch Port, page 11-13](#)

For information about configuring the CPE 10/100 port speed and duplex mode, see the “Ports on the Catalyst 2950 LRE Switches” section on page 13-1 and the “CPE Ethernet Link Guidelines” section on page 13-11.

## Configuration Guidelines

When configuring an interface speed and duplex mode, note these guidelines:

- Ethernet ports set to 1000 Mbps should always be set to full duplex.
- Gigabit Ethernet ports that do not match the settings of an attached device can lose connectivity and do not generate statistics.
- If both ends of the line support autonegotiation, we highly recommend the default setting of **autonegotiation**.

- When connecting an interface to a 100BASE-T device that does not autonegotiate, set the speed to a non-auto value (for example, nonegotiate) and set the duplex mode to full or half to match the device. The speed value and duplex mode must be explicitly set.
- When connecting an interface to a Gigabit Ethernet device that does not autonegotiate, disable autonegotiation on the switch and set the duplex and flow control parameters to be compatible with the remote device.
- 100BASE-FX ports operate only at 100 Mbps and in full-duplex mode.
- 1000BASE-SX ports operate only at 1000 Mbps and in full-duplex mode.
- 1000BASE-T GBICs operate only at 1000Mbps and in full-duplex mode.
- You can configure the 10/100/1000 ports on the Catalyst 2950T-24 and Catalyst 2950T-48-SI switches to autonegotiate the duplex mode by using the **duplex auto** interface configuration command, or you can manually set the duplex mode to full by using the **duplex full** command.

The 10/100/1000 ports on the Catalyst 2950T-24 switches operate only in full-duplex mode. The ports do not support the **half** keyword in the **duplex** command.

The 10/100/1000 ports on the Catalyst 2950T-48-SI switches support the **half** keyword when the interface speed is 10 or 100 Mbps.

- 10/100/1000 ports on the Catalyst 2950 LRE or the Catalyst 2955T-12 switch can operate at 10 or 100 Mbps in either half- or full-duplex mode. The ports can operate at 1000 Mbps only in full-duplex mode.
- Fiber-optic SFP-module ports on the Catalyst 2950 LRE switch operate only at 1000 Mbps in full-duplex mode.
- GigaStack-to-GigaStack cascade connections operate in half-duplex mode, and GigaStack-to-GigaStack point-to-point connections operate in full-duplex mode.
- When Spanning Tree Protocol (STP) is enabled and a port is reconfigured, the switch can take up to 30 seconds to check for loops. The port LED is amber while STP reconfigures.
- On the 10/100/1000 ports on an LRE switch, use the **speed** and **duplex** interface commands. You cannot configure the speed and duplex settings on the fiber-optic SFP-module ports.

For example, if you enter the **speed 100** and the **duplex half** interface configuration commands and the fiber-optic SFP-module port is active, the switch attempts to autonegotiate the speed and duplex settings as 1000 Mbps with full autonegotiation.

If you enter the **speed 100** and the **duplex half** interface configuration commands and the 10/100/1000 port is active, the switch advertises the speed and duplex settings as 10 Mbps and half duplex.

- On the LRE ports on an LRE switch, use the **local speed** and the **local duplex** interface configuration commands.



#### Caution

---

Changing the interface speed and duplex mode configuration might shut down and re-enable the interface during the reconfiguration.

---

## Setting the Interface Speed and Duplex Parameters on a Non-LRE Switch Port

Beginning in privileged EXEC mode, follow these steps to set the speed and duplex mode for a physical interface on a non-LRE switch:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface</b> <i>interface-id</i>	Enter interface configuration mode and the physical interface identification.
Step 3	<b>speed</b> { <b>10</b>   <b>100</b>   <b>1000</b>   <b>auto</b>   <b>nonegotiate</b> }	Enter the appropriate speed parameter for the interface, or enter <b>auto</b> or <b>nonegotiate</b> .  <b>Note</b> The <b>1000</b> keyword is available only for 10/100/1000 Mbps ports. 100BASE-FX ports operate only at 100 Mbps. 1000BASE-SX ports and GBIC module ports operate only at 1000 Mbps. The <b>nonegotiate</b> keyword is available only for 1000BASE-SX, -LX, and -ZX GBIC ports.
Step 4	<b>duplex</b> { <b>auto</b>   <b>full</b>   <b>half</b> }	Enter the duplex parameter for the interface. For configuration guidelines, see the “ <a href="#">Configuration Guidelines</a> ” section on page 11-11.  <b>Note</b> The <b>duplex</b> keyword is not available on GBIC ports.
Step 5	<b>end</b>	Return to privileged EXEC mode.
Step 6	<b>show interfaces</b> <i>interface-id</i>	Display the interface speed and duplex mode configuration.
Step 7	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

Use the **no speed** and **no duplex** interface configuration commands to return the interface to the default speed and duplex settings (autonegotiate). To return all interface settings to the defaults, use the **default interface** *interface-id* interface configuration command.

This example shows how to set the interface speed to 10 Mbps and the duplex mode to half on Fast Ethernet interface 0/3 and to verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet0/3
Switch(config-if)# speed 10
Switch(config-if)# duplex half
Switch(config)# end
Switch# show running-config
Building configuration...

Current configuration : 1954 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch
!
<output truncated>
!
interface FastEthernet0/3
 switchport mode trunk
 no ip address
```

```

duplex half
speed 10
!
<output truncated>

```

## Setting the Interface Speed and Duplex Parameters on an LRE Switch Port

Beginning in privileged EXEC mode, follow these steps to set the speed and duplex mode for an LRE interface on an LRE switch:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface</b> <i>interface-id</i>	Enter interface configuration mode and the physical interface identification.
Step 3	<b>local speed</b> {10   100}	Enter the appropriate speed parameter for the interface.
Step 4	<b>local duplex</b> {full   half}	Enter the duplex parameter for the interface.
Step 5	<b>end</b>	Return to privileged EXEC mode.
Step 6	<b>show running-config</b>	Display the LRE interface speed and duplex mode configuration.
Step 7	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

Use the **no local speed** and **no local duplex** interface configuration commands to return the interface to the default speed and duplex settings. To return all interface settings to the defaults, use the **default interface** *interface-id* interface configuration command.

## Configuring Media Types for Gigabit Ethernet Interfaces on LRE Switches

On the LRE switches, use the **media-type** interface configuration command to configure the media type for Gigabit Ethernet interfaces. You can enable or disable fiber-optic or copper (10/100/1000) connections. You can also manually set the port to select an SFP connector or an RJ45 connector. Use the **no** form of this command to return to the default setting of SFP-preferred. To configure media types, use the **media-type** {auto-select | rj45 | sfp} interface configuration command.

For more information, refer to the command reference for this release.

## Configuring IEEE 802.3X Flow Control on Gigabit Ethernet Ports

Flow control is supported only on the 10/100/1000, 1000BASE-SX, GBIC-module, and SFP-module ports. Flow control enables connected Gigabit Ethernet ports to control traffic rates during congestion by allowing congested nodes to pause link operation at the other end. If one port experiences congestion and cannot receive any more traffic, it notifies the other port to stop sending until the condition clears. When the local device detects any congestion at its end, it can notify the link partner or the remote device of the congestion by sending a pause frame. Upon receipt of a pause frame, the remote device stops sending any data packets, which prevents any loss of data packets during the congestion period.

**Note**

We strongly recommend that you do not configure IEEE 802.3X flow control when quality of service (QoS) is configured on the switch. Before configuring flow control on an interface, make sure to return to the default QoS settings listed in the [“Default Standard QoS Configuration”](#) section on page 30-16.

Flow control can be implemented in two forms, symmetric and asymmetric. The symmetric implementation is suitable for point-to-point links, and asymmetric is suitable for hub-to-end node connections, where it is desirable for the hub to pause the end system, but not vice-versa. You use the **flowcontrol** interface configuration command to set the interface’s ability to **receive** and **send** pause frames to **on**, **off**, or **desired**. The default state for Gigabit Ethernet ports is **receive off** and **send desired**. The default state for Fast Ethernet ports is **receive off** and **send off**.

These rules apply to flow control settings on the device:

- **receive on** (or **desired**) and **send on**: Flow control operates in both directions; both the local and the remote devices can send pause frames to show link congestion.
- **receive on** (or **desired**) and **send desired**: The port can receive pause frames and can send pause frames if the attached device supports flow control.
- **receive on** (or **desired**) and **send off**: The port cannot send pause frames but can operate with an attached device that is required to or can send pause frames; the port can receive pause frames.
- **receive off** and **send on**: The port sends pause frames if the remote device supports flow control but cannot receive pause frames from the remote device.
- **receive off** and **send desired**: The port cannot receive pause frames but can send pause frames if the attached device supports flow control.
- **receive off** and **send off**: Flow control does not operate in either direction. In case of congestion, no indication is given to the link partner, and no pause frames are sent or received by either device.

**Note**

For details about the command settings and the resulting flow control resolution on local and remote ports, refer to the **flowcontrol** interface configuration command in the command reference for this release.

Beginning in privileged EXEC mode, follow these steps to configure flow control on an interface:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode
Step 2	<b>interface</b> <i>interface-id</i>	Enter interface configuration mode and the physical interface to be configured.
Step 3	<b>flowcontrol</b> { <b>receive</b>   <b>send</b> } { <b>on</b>   <b>off</b>   <b>desired</b> }	Configure the flow control mode for the port.
Step 4	<b>end</b>	Return to privileged EXEC mode.
Step 5	<b>show interfaces</b> <i>interface-id</i>	Verify the interface flow control settings.
Step 6	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

To disable flow control, use the **flowcontrol receive off** and **flowcontrol send off** interface configuration commands.

This example shows how to turn off all flow control on Gigabit Ethernet interface 0/1 and to display the results:

```
Switch# configure terminal
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# flowcontrol receive off
Switch(config-if)# flowcontrol send off
Switch(config-if)# end
Switch# show running-config
```

## 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 these commands: **show configuration**, **show running-config**, and **show interfaces**.

Beginning in privileged EXEC mode, follow these steps to add a description for an interface:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode
Step 2	<b>interface</b> <i>interface-id</i>	Enter interface configuration mode, and enter the interface for which you are adding a description.
Step 3	<b>description</b> <i>string</i>	Add a description (up to 240 characters) for an interface.
Step 4	<b>end</b>	Return to privileged EXEC mode.
Step 5	<b>show interfaces</b> <i>interface-id</i> <b>description</b> or <b>show running-config</b>	Verify your entry.
Step 6	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

Use the **no description** interface configuration command to delete the description.

This example shows how to add a description on Fast Ethernet interface 0/4 and to verify the description:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet0/4
Switch(config-if)# description Connects to Marketing
Switch(config-if)# end
Switch# show interfaces fastethernet0/4 description
Interface Status      Protocol Description
Fa0/4      up                down      Connects to Marketing
```

## Monitoring and Maintaining the Interfaces

You can perform the tasks in these sections to monitor and maintain interfaces:

- [Monitoring Interface and Controller Status](#), page 11-17
- [Clearing and Resetting Interfaces and Counters](#), page 11-19
- [Shutting Down and Restarting the Interface](#), page 11-19

## Monitoring Interface and Controller Status

Commands entered at the privileged EXEC prompt display information about the interface, including the version of the software and the hardware, the controller status, and statistics about the interfaces. Table 11-2 lists some of these interface monitoring commands. (You can display the full list of **show** commands by using the **show ?** command at the privileged EXEC prompt.) These commands are fully described in the *Cisco IOS Interface Command Reference for Cisco IOS Release 12.1*.

**Table 11-2** *show* Commands for Interfaces

Command	Purpose
<b>show interfaces</b> [ <i>interface-id</i> ]	Display the status and configuration of all interfaces or a specific interface.
<b>show interfaces</b> [ <i>interface-id</i> ] <b>capabilities</b> [ <b>module</b> { <i>module-number</i> }]	Display the capabilities of an interface. If you do not specify a module, the capabilities for all ports on the switch appear.
<b>show interfaces</b> <i>interface-id</i> <b>status</b> [ <b>err-disabled</b> ]	Display interface status or a list of interfaces in error-disabled state.
<b>show interfaces</b> [ <i>interface-id</i> ] <b>switchport</b>	Display administrative and operational status of switching (nonrouting) ports.
<b>show interfaces</b> [ <i>interface-id</i> ] <b>description</b>	Display the description configured on an interface or all interfaces and the interface status.
<b>show ip interface</b> [ <i>interface-id</i> ]	Display the usability status of all interfaces configured for IP or the specified interface.
<b>show running-config interface</b> [ <i>interface-id</i> ]	Display the running configuration in RAM for the interface.
<b>show version</b>	Display the hardware configuration, software version, the names and sources of configuration files, and the boot images.

If you enter the **show interfaces** *interfaces-id* privileged EXEC command on a LRE switch interface, the command output shows the statistics for the LRE interface. It does not show the statistics for the 10/100 Ethernet ports on the attached CPE device. The output also shows that the speed and duplex settings of the LRE interface are never autonegotiated but are always forced (in other words, the speed and duplex settings will be 100 Mbps and half duplex, 100 Mbps and full duplex, 10 Mbps and half duplex, or 10 Mbps and full duplex).

This example shows how to display the status of all interfaces on a non-LRE switch:

```
Switch# show interfaces status
```

```
Port    Name           Status      Vlan    Duplex  Speed Type
Fa0/1   Fa0/1          connected   1       a-full  a-100 10/100BaseTX
Fa0/2   Fa0/2          notconnect  1       auto    auto  10/100BaseTX
Fa0/3   Fa0/3          notconnect  1       auto    auto  10/100BaseTX
```

```
<output truncated>
```

```
Fa0/23   Fa0/23         notconnect  1       auto    auto  10/100BaseTX
Fa0/24   Fa0/24         notconnect  1       auto    auto  10/100BaseTX
Gi0/1    Gi0/1          notconnect  1       auto    auto  unknown
Gi0/2    Gi0/2          notconnect  1       auto    auto  unknown
```

This example shows how to display the status of switching ports:

```
Switch# show interfaces switchport
Name: Fa0/1
Switchport:Enabled
Administrative Mode:dynamic desirable
Operational Mode:static access
Administrative Trunking Encapsulation:negotiate
Negotiation of Trunking:On
Access Mode VLAN:1 (default)
Trunking Native Mode VLAN:1 (default)
Voice VLAN:none
Administrative private-vlan host-association:none
Administrative private-vlan mapping:none
Operational private-vlan:none
Trunking VLANs Enabled:ALL
Pruning VLANs Enabled:2-1001
Capture Mode: Disabled
Capture VLANs Allowed:ALL

Protected:true
Unknown unicast blocked:disabled
Unknown multicast blocked:disabled

Voice VLAN:none (Inactive)
Appliance trust:none

Name: Fa0/2
Switchport: Enabled
Administrative Mode: static access
Operational Mode: down
```

<output truncated>

This example shows how to display the running configuration of Fast Ethernet interface 0/2:

```
Switch# show running-config interface fastethernet0/2
Building configuration...

Current configuration : 131 bytes
!
interface FastEthernet0/2
 switchport mode access
 switchport protected
 no ip address
 mls qos cos 7
 mls qos cos override
end
```

For additional examples of the **show interfaces** privileged EXEC command output, refer to the command reference for this release.

## Clearing and Resetting Interfaces and Counters

Table 11-3 lists the privileged EXEC mode **clear** commands that you can use to clear counters and reset interfaces.

**Table 11-3** Clear Commands for Interfaces

Command	Purpose
<b>clear counters</b> <i>[interface-id]</i>	Clear interface counters.
<b>clear interface</b> <i>interface-id</i>	Reset the hardware logic on an interface.
<b>clear line</b> <i>[number   console 0   vty number]</i>	Reset the hardware logic on an asynchronous serial line.

To clear the interface counters shown by the **show interfaces** privileged EXEC command, use the **clear counters** privileged EXEC command. The **clear counters** command clears all current interface counters from the interface unless optional arguments are specified to clear only a specific interface type from a specific interface number.



### Note

The **clear counters** privileged EXEC command does not clear counters retrieved by using Simple Network Management Protocol (SNMP), but only those seen with the **show interfaces** privileged EXEC command output.

This example shows how to clear and reset the counters on Fast Ethernet interface 0/5:

```
Switch# clear counters fastethernet0/5
Clear "show interface" counters on this interface [confirm] y
Switch#
*Sep 30 08:42:55: %CLEAR-5-COUNTERS: Clear counter on interface FastEthernet0/5
by vty1 (171.69.115.10)
```

Use the **clear interface** or **clear line** privileged EXEC command to clear and reset an interface or serial line. Under most circumstances, you do not need to clear the hardware logic on interfaces or serial lines.

This example shows how to clear and reset Fast Ethernet interface 0/5:

```
Switch# clear interface fastethernet0/5
```

## Shutting Down and Restarting the Interface

Shutting down an interface 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.

Beginning in privileged EXEC mode, follow these steps to shut down an interface:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface</b> { <i>vlan vlan-id</i> }   { <b>fastethernet</b>   <b>gigabitethernet</b> } <i>interface-id</i> }   { <b>port-channel</b> <i>port-channel-number</i> }	Select the interface to be configured.
Step 3	<b>shutdown</b>	Shut down an interface.

	Command	Purpose
Step 4	<b>end</b>	Return to privileged EXEC mode.
Step 5	<b>show running-config</b>	Verify your entry.

Use the **no shutdown** interface configuration command to restart the interface.

When the **shutdown** interface configuration command is entered on an LRE interface, the LRE link is shut down. To shut down the 10/100 Ethernet ports on CPE device, use the **cpe shutdown [port port-id]** interface configuration command.

This example shows how to shut down Fast Ethernet interface 0/5:

```
Switch# configure terminal
Switch(config)# interface fastethernet0/5
Switch(config-if)# shutdown
Switch(config-if)#
*Sep 30 08:33:47: %LINK-5-CHANGED: Interface FastEthernet0/5, changed state to a
administratively down
```

This example shows how to re-enable Fast Ethernet interface 0/5:

```
Switch# configure terminal
Switch(config)# interface fastethernet0/5
Switch(config-if)# no shutdown
Switch(config-if)#
*Sep 30 08:36:00: %LINK-3-UPDOWN: Interface FastEthernet0/5, changed state to up
```

To verify that an interface is disabled, enter the **show interfaces** privileged EXEC command. A disabled interface appears as *administratively down* in the **show interfaces** command output.