



# Configuring Interface Characteristics

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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

## Information About Configuring Interface Characteristics

### Interface Types

This section describes the different types of interfaces supported by the switch. The rest of the chapter describes configuration procedures for physical interface characteristics.



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**Note** The stack ports on the rear of the stacking-capable switches are not Ethernet ports and cannot be configured.

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#### Related Topics

[Configuring Interfaces](#), on page 15

## 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. 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. VLANs can be formed with ports across the stack.

To configure VLANs, use the **vlan** *vlan-id* global configuration command to enter VLAN configuration mode. The VLAN configurations for normal-range VLANs (VLAN IDs 1 to 1005) are saved in the VLAN database. If VTP is version 1 or 2, to configure extended-range VLANs (VLAN IDs 1006 to 4094), you must first set VTP mode to transparent. Extended-range VLANs created in transparent mode are not added to the VLAN database but are saved in the switch running configuration. With VTP version 3, you can create extended-range VLANs in client or server mode. These VLANs are saved in the VLAN database.

In a switch stack, the VLAN database is downloaded to all switches in a stack, and all switches in the stack build the same VLAN database. The running configuration and the saved configuration are the same for all switches in a stack.

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.
- For a tunnel port, set and define the VLAN ID for the customer-specific VLAN tag.

## Switch Ports

Switch ports are Layer 2-only interfaces associated with a physical port. Switch ports belong to one or more VLANs. 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 set the switchport mode by negotiating with the port on the other end of the link. Switch ports are used for managing the physical interface and associated Layer 2 protocols and do not handle routing or bridging.

Configure switch ports by using the **switchport** interface configuration commands.

## 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 a tagged packet (Inter-Switch Link [ISL] or IEEE 802.1Q tagged), the packet is dropped, and the source address is not learned.

The types of access ports supported are:

- Static access ports are manually assigned to a VLAN (or through a RADIUS server for use with IEEE 802.1x).
- VLAN membership of dynamic access ports is learned through incoming packets. By default, a dynamic access port is not a member of any 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 6500 series switch; the switch cannot be a VMPS server.

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.

## Trunk Ports

A trunk port carries the traffic of multiple VLANs and by default is a member of all VLANs in the VLAN database. These trunk port types are supported:

- In an ISL trunk port, all received packets are expected to be encapsulated with an ISL header, and all transmitted packets are sent with an ISL header. Native (non-tagged) frames received from an ISL trunk port are dropped.
- An IEEE 802.1Q trunk port supports simultaneous tagged and untagged traffic. An IEEE 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 4094) are in the allowed list. A trunk port can become a member of a VLAN only if VTP knows of the VLAN and if 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.

## Tunnel Ports

Tunnel ports are used in IEEE 802.1Q tunneling to segregate the traffic of customers in a service-provider network from other customers who are using the same VLAN number. You configure an asymmetric link from a tunnel port on a service-provider edge switch to an IEEE 802.1Q trunk port on the customer switch. Packets entering the tunnel port on the edge switch, already IEEE 802.1Q-tagged with the customer VLANs, are encapsulated with another layer of an IEEE 802.1Q tag (called the metro tag), containing a VLAN ID unique in the service-provider network, for each customer. The double-tagged packets go through the service-provider network keeping the original customer VLANs separate from those of other customers. At the outbound interface, also a tunnel port, the metro tag is removed, and the original VLAN numbers from the customer network are retrieved.

Tunnel ports cannot be trunk ports or access ports and must belong to a VLAN unique to each customer.

## Routed Ports

A routed port is a physical port that acts like a port on a router; it does not have to be connected to a router. A routed port is not associated with a particular VLAN, as is an access port. A routed port behaves like a regular router interface, except that it does not support VLAN subinterfaces. Routed ports can be configured with a Layer 3 routing protocol. A routed port is a Layer 3 interface only and does not support Layer 2 protocols, such as DTP and STP.




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**Note** Routed ports are not supported on switches running the LAN Base image. However, with the LAN Base image, you can configure up to 16 static routes on SVIs.

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Configure routed ports by putting the interface into Layer 3 mode with the **no switchport** interface configuration command. Then assign an IP address to the port, enable routing, and assign routing protocol characteristics by using the **ip routing** and **router protocol** global configuration commands.




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**Note** Entering a **no switchport** interface configuration command shuts down the interface and then re-enables it, which might generate messages on the device to which the interface is connected. When you put an interface that is in Layer 2 mode into Layer 3 mode, the previous configuration information related to the affected interface might be lost.

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The number of routed ports that you can configure is not limited by software. However, the interrelationship between this number and the number of other features being configured might impact CPU performance because of hardware limitations.




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**Note** The IP Base image supports static routing and the Routing Information Protocol (RIP). The LAN Base image supports 16 user-configured static routes on SVIs. For full Layer 3 routing or for fallback bridging, you must enable the IP Services image on the standalone switch, or the active switch.

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## Switch Virtual Interfaces

A switch virtual interface (SVI) represents a VLAN of switch ports as one interface to the routing or bridging function in the system. You can associate only one SVI with a VLAN. You configure an SVI for a VLAN only to route between VLANs or to provide IP host connectivity to the switch. By default, an SVI is created for the default VLAN (VLAN 1) to permit remote switch administration. Additional SVIs must be explicitly configured.




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**Note** You cannot delete interface VLAN 1.

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SVIs provide IP host connectivity only to the system. SVIs are created the first time that you enter the **vlan** interface configuration command for a VLAN interface. The VLAN corresponds to the VLAN tag associated with data frames on an ISL or IEEE 802.1Q encapsulated trunk or the VLAN ID configured for an access port. Configure a VLAN interface for each VLAN for which you want to route traffic, and assign it an IP address.

Although the switch stack or switch supports a total of 1005 VLANs and SVIs (255 if the switch is running the LAN Base image), the interrelationship between the number of SVIs and routed ports and the number of other features being configured might impact CPU performance because of hardware limitations.

When you create an SVI, it does not become active until it is associated with a physical port.

## SVI Autostate Exclude

The line state of an SVI with multiple ports on a VLAN is in the *up* state when it meets these conditions:

- The VLAN exists and is active in the VLAN database on the switch
- The VLAN interface exists and is not administratively down.
- At least one Layer 2 (access or trunk) port exists, has a link in the *up* state on this VLAN, and is in the spanning-tree forwarding state on the VLAN.



**Note** The protocol link state for VLAN interfaces come up when the first switchport belonging to the corresponding VLAN link comes up and is in STP forwarding state.

The default action, when a VLAN has multiple ports, is that the SVI goes down when all ports in the VLAN go down. You can use the SVI autostate exclude feature to configure a port so that it is not included in the SVI line-state up-or-down calculation. For example, if the only active port on the VLAN is a monitoring port, you might configure autostate exclude on that port so that the VLAN goes down when all other ports go down. When enabled on a port, **autostate exclude** applies to all VLANs that are enabled on that port.

The VLAN interface is brought up when one Layer 2 port in the VLAN has had time to converge (transition from STP listening-learning state to forwarding state). This prevents features such as routing protocols from using the VLAN interface as if it were fully operational and minimizes other problems, such as routing black holes.

## EtherChannel Port Groups

EtherChannel port groups 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, group multiple access ports into one logical access port, group multiple tunnel ports into one logical tunnel port, or group multiple routed ports into one logical routed 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), and the Port Aggregation Protocol (PAgP), 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 3 interfaces, you manually create the logical interface by using the **interface port-channel** global configuration command. Then you manually assign an interface to the EtherChannel by using the **channel-group** interface configuration command. For Layer 2 interfaces, use the **channel-group** interface configuration command to dynamically create the port-channel logical interface. This command binds the physical and logical ports together.

## 10-Gigabit Ethernet Interfaces

A 10-Gigabit Ethernet interface operates only in full-duplex mode. The interface can be configured as a switched or routed port.

The switch has a network module slot into which you can insert a 10-Gigabit Ethernet network module, a 1-Gigabit Ethernet network module, or a blank module.

A 10-Gigabit Ethernet interface operates only in full-duplex mode. The interface can be configured as a switched or routed port.

For more information about the Cisco TwinGig Converter Module, see the switch hardware installation guide and your transceiver module documentation.

## Power over Ethernet Ports

A PoE-capable switch port automatically supplies power to one of these connected devices if the switch senses that there is no power on the circuit:

- a Cisco pre-standard powered device (such as a Cisco IP Phone or a Cisco Aironet Access Point)
- an IEEE 802.3af-compliant powered device

A powered device can receive redundant power when it is connected to a PoE switch port and to an AC power source. The device does not receive redundant power when it is only connected to the PoE port.

## Using the Switch USB Ports

The switch has two USB ports on the front panel — a USB mini-Type B console port and a USB Type A port.

### Related Topics

[Configuring the Console Media Type](#), on page 26

[Configuring the USB Inactivity Timeout](#), on page 27

## USB Mini-Type B Console Port

The switch has the following console ports:

- USB mini-Type B console connection
- RJ-45 console port

Console output appears on devices connected to both ports, but console input is active on only one port at a time. By default, the USB connector takes precedence over the RJ-45 connector.



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**Note** Windows PCs require a driver for the USB port. See the hardware installation guide for driver installation instructions.

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Use the supplied USB Type A-to-USB mini-Type B cable to connect a PC or other device to the switch. The connected device must include a terminal emulation application. When the switch detects a valid USB connection to a powered-on device that supports host functionality (such as a PC), input from the RJ-45 console is immediately disabled, and input from the USB console is enabled. Removing the USB connection immediately reenables input from the RJ-45 console connection. An LED on the switch shows which console connection is in use.

## Console Port Change Logs

At software startup, a log shows whether the USB or the RJ-45 console is active. Each switch in a stack issues this log. Every switch always first displays the RJ-45 media type.

In the sample output, Switch 1 has a connected USB console cable. Because the bootloader did not change to the USB console, the first log from Switch 1 shows the RJ-45 console. A short time later, the console changes and the USB console log appears. Switch 2 and Switch 3 have connected RJ-45 console cables.

```
switch-stack-1
*Mar 1 00:01:00.171: %USB_CONSOLE-6-MEDIA_RJ45: Console media-type is RJ45.
*Mar 1 00:01:00.431: %USB_CONSOLE-6-MEDIA_USB: Console media-type is USB.

switch-stack-2
*Mar 1 00:01:09.835: %USB_CONSOLE-6-MEDIA_RJ45: Console media-type is RJ45.

switch-stack-3
*Mar 1 00:01:10.523: %USB_CONSOLE-6-MEDIA_RJ45: Console media-type is RJ45.
```

When the USB cable is removed or the PC de-activates the USB connection, the hardware automatically changes to the RJ-45 console interface:

```
switch-stack-1
Mar 1 00:20:48.635: %USB_CONSOLE-6-MEDIA_RJ45: Console media-type is RJ45.
```

You can configure the console type to always be RJ-45, and you can configure an inactivity timeout for the USB connector.

## USB Type A Port

The USB Type A port provides access to external USB flash devices, also known as thumb drives or USB keys. The port supports Cisco USB flash drives with capacities from 128 MB to 8 GB (USB devices with port densities of 128 MB, 256 MB, 1 GB, 4 GB, 8 GB are supported). You can use standard Cisco IOS command-line interface (CLI) commands to read, write, erase, and copy to or from the flash device. You can also configure the switch to boot from the USB flash drive.

### Booting from the USB Flash Device

#### Procedure

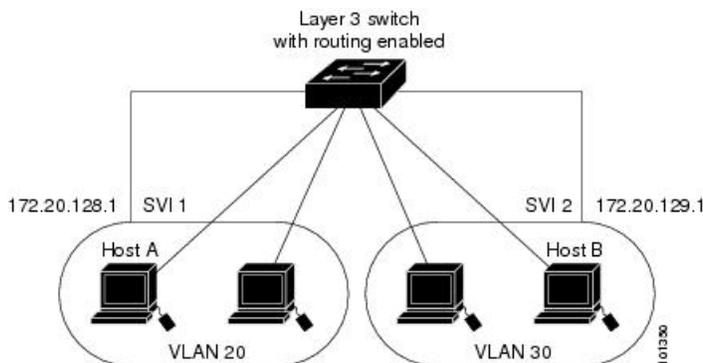
|               | Command or Action   | Purpose   |
|---------------|---|---|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br><br>Switch> <b>enable</b>   | Enables privileged EXEC mode. Enter your password if prompted.  |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br><br>Switch# <b>configure terminal</b>                           | Enters the global configuration mode.   |
| <b>Step 3</b> | <b>boot system flash usbflash0: image</b><br><b>Example:</b><br><br>Switch(config-if)# <b>boot system flash</b> | Configures the switch to boot from the USB flash device. The image is the name of the bootable image. |

|               | Command or Action   | Purpose  |
|---------------|---|--|
|               | usbflash0: c3750x-universal-mz  |  |
| <b>Step 4</b> | <b>show boot</b><br><b>Example:</b><br>Switch# <code>show boot</code>   | Verifies the settings of the boot environment variables. |
| <b>Step 5</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br>Switch# <code>copy running-config startup-config</code> | (Optional) Saves your entries in the configuration file. |

## Interface Connections

Devices within a single VLAN can communicate directly through any switch. Ports in different VLANs cannot exchange data without going through a routing device. With a standard Layer 2 switch, ports in different VLANs have to exchange information through a router. By using the switch with routing enabled, when you configure both VLAN 20 and VLAN 30 with an SVI to which an IP address is assigned, packets can be sent from Host A to Host B directly through the switch with no need for an external router.

**Figure 1: Connecting VLANs with the Switch**



When the IP Services image is running on the switch or the active switch, the switch uses two methods to forward traffic between interfaces: routing and fallback bridging. If the IP Base image is on the switch or the active switch, only basic routing (static routing and RIP) is supported. Whenever possible, to maintain high performance, forwarding is done by the switch hardware. However, only IPv4 packets with Ethernet II encapsulation are routed in hardware. Non-IP traffic and traffic with other encapsulation methods are fallback-bridged by hardware.

- The routing function can be enabled on all SVIs and routed ports. The switch routes only IP traffic. When IP routing protocol parameters and address configuration are added to an SVI or routed port, any IP traffic received from these ports is routed.
- Fallback bridging forwards traffic that the switch does not route or traffic belonging to a nonroutable protocol, such as DECnet. Fallback bridging connects multiple VLANs into one bridge domain by

bridging between two or more SVIs or routed ports. When configuring fallback bridging, you assign SVIs or routed ports to bridge groups with each SVI or routed port assigned to only one bridge group. All interfaces in the same group belong to the same bridge domain.

## Interface Configuration Mode

The switch supports these interface types:

- Physical ports—switch ports and routed ports
- VLANs—switch virtual interfaces
- Port channels—EtherChannel interfaces

You can also configure a range of interfaces.

To configure a physical interface (port), specify the interface type, stack member number (only stacking-capable switches), module number, and switch port number, and enter interface configuration mode.

- Type—Gigabit Ethernet (gigabitethernet or gi) for 10/100/1000 Mb/s Ethernet ports, 10-Gigabit Ethernet (tengigabitethernet or te) for 10,000 Mb/s, or small form-factor pluggable (SFP) module Gigabit Ethernet interfaces (gigabitethernet or gi).
- Stack member number—The number that identifies the switch within the stack. The switch number range is 1 to 9 and is assigned the first time the switch initializes. The default switch number, before it is integrated into a switch stack, is 1. When a switch has been assigned a stack member number, it keeps that number until another is assigned to it.

You can use the switch port LEDs in Stack mode to identify the stack member number of a switch.

- Module number—The module or slot number on the switch: switch (downlink) ports are 0, and uplink ports are 1.
- Port number—The interface number on the switch. The 10/100/1000 port numbers always begin at 1, starting with the far left port when facing the front of the switch, for example, gigabitethernet1/0/1 or gigabitethernet1/0/8.

On a switch with 10/100/1000 ports and Cisco TwinGig Converter Modules in the 10-GigabitEthernet module slots, the port numbers restart with the 10-Gigabit Ethernet ports:tengigabitethernet1/0/1

On a switch with 10/100/1000 ports and Cisco dual SFP X2 converter modules in the 10-Gigabit Ethernet module slots, the SFP module ports are numbered consecutively following the 10/100/1000 interfaces. For example, if the switch has 24 10/100/1000 ports, the SFP module ports are gigabitethernet1/0/25 through gigabitethernet1/0/28.

You can identify physical interfaces by physically checking the interface location on the switch. You can also use the **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.

These are examples of how to identify interfaces on a stacking-capable switch:

- To configure 10/100/1000 port 4 on a standalone switch, enter this command:

```
Switch(config)# interface gigabitethernet1/0/4
```

- To configure 10-Gigabit Ethernet port 1 on a standalone switch, enter this command:

```
Switch(config)# interface tengigabitethernet1/0/1
```

- To configure 10-Gigabit Ethernet port on stack member 3, enter this command:

```
Switch(config)# interface tengigabitethernet3/0/1
```

- To configure the first SFP module port on stack member 1 with 16 10/100/1000 ports, enter this command:

```
Switch(config)# interface gigabitethernet1/0/25
```

## Interface Range Configuration Guidelines

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

- Valid entries for port-range:
  - **vlan** *vlan-ID - vlan-ID*, where the VLAN ID is 1 to 4094.
  - **gigabitethernet module/***{first port} -{last port}*, where the module is always 0.
  - **gigabitethernet stack member/module***{first port} -{last port}*, where the module is always 0.
  - **gigabitethernet module/***{first port} -{last port}*, where the module is always 0.
  - **tengigabitethernet stack member/module***{first port} -{last port}*, where the module is always 0.
  - **port-channel***port -channel-number-port -channel-number*, where the port channel number is 1 to 48.




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**Note** When you use the **interface range** command with port channels, the first and last port-channel number must be active port channels.

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- You must add a space between the first interface number and the hyphen when using the interface range command. For example, the command **interface range gigabitethernet1/0/1 - 4** is a valid range; the command **interface range gigabitethernet1/0/1-4** is not a valid range.
- The **interface range** command only works with VLAN interfaces that have been configured with the **interface vlan** command. The **show running-config** privileged EXEC command displays the configured VLAN interfaces. VLAN interfaces not displayed by the **show running-config** command cannot be used with the **interface range** command.
- All interfaces defined in a range must be the same type (all Gigabit Ethernet ports, all 10-Gigabit Ethernet ports, all EtherChannel ports, or all VLANs), but you can enter multiple ranges in a command.

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 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.

### Related Topics

- [Adding a Description for an Interface](#), on page 22
- [Configuring a Range of Interfaces](#), on page 17
- [Configuring and Using Interface Range Macros](#), on page 18

## Interface Speed and Duplex Mode

Ethernet interfaces on the switch operate at 10, 100, 1000, or 10,000 Mb/s and in either full- or half-duplex mode. In full-duplex mode, two stations can send and receive traffic at the same time. Normally, 10-Mb/s ports operate in half-duplex mode, which means that stations can either receive or send traffic.

Switch models include Gigabit Ethernet (10/100/1000-Mb/s) ports, 10-Gigabit Ethernet ports, and small form-factor pluggable (SFP) module slots supporting SFP modules.

## Speed and Duplex Configuration Guidelines

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

- The 10-Gigabit Ethernet ports do not support the speed and duplex features. These ports operate only at 10,000 Mb/s and in full-duplex mode.
- Gigabit Ethernet (10/100/1000-Mb/s) ports support all speed options and all duplex options (auto, half, and full). However, Gigabit Ethernet ports operating at 1000 Mb/s do not support half-duplex mode.
- For SFP module ports, the speed and duplex CLI options change depending on the SFP module type:
  - The 1000BASE-*x* (where *x* is -BX, -CWDM, -LX, -SX, and -ZX) SFP module ports support the **nonegotiate** keyword in the **speed** interface configuration command. Duplex options are not supported.
  - The 1000BASE-T SFP module ports support the same speed and duplex options as the 10/100/1000-Mb/s ports.
- If both ends of the line support autonegotiation, we highly recommend the default setting of **auto** negotiation.
- If one interface supports autonegotiation and the other end does not, configure duplex and speed on both interfaces; do not use the **auto** setting on the supported side.
- When 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. As best practice, we suggest configuring the speed and duplex options on a link to auto or to fixed on both the ends. If one side of the link is configured to auto and the other side is configured to fixed, the link will not be up and this is expected.
- As best practice, we suggest configuring the speed and duplex options on a link to auto or to fixed on both the ends. If one side of the link is configured to auto and the other side is configured to fixed, the link will not be up and this is expected.



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**Caution**

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

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**Related Topics**

[Setting the Interface Speed and Duplex Parameters](#), on page 20

## IEEE 802.3x Flow Control

Flow control enables connected 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 by sending a pause frame to stop sending until the condition clears. Upon receipt of a pause frame, the sending device stops sending any data packets, which prevents any loss of data packets during the congestion period.



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**Note** The switch ports can receive, but not send, pause frames.

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You use the **flowcontrol** interface configuration command to set the interface's ability to **receive** pause frames to **on**, **off**, or **desired**. The default state is **off**.

When set to **desired**, an interface can operate with an attached device that is required to send flow-control packets or with an attached device that is not required to but can send flow-control packets.

These rules apply to flow control settings on the device:

- **receive on** (or **desired**): 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**: 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.



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

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**Related Topics**

[Configuring IEEE 802.3x Flow Control](#), on page 21

## Default Ethernet Interface Configuration

To configure Layer 2 parameters, if the interface is in Layer 3 mode, you must enter the **switchport** interface configuration command without any parameters to put the interface into Layer 2 mode. This shuts down the interface and then re-enables it, which might generate messages on the device to which the interface is connected. When you put an interface that is in Layer 3 mode into Layer 2 mode, the previous configuration information related to the affected interface might be lost, and the interface is returned to its default configuration.

This table shows the Ethernet interface default configuration, including some features that apply only to Layer 2 interfaces.

**Table 1: Default Layer 2 Ethernet Interface Configuration**

| Feature   | Default Setting   |
|---|---|
| Operating mode  | Layer 2 or switching mode ( <b>switchport</b> command).   |
| Allowed VLAN range  | VLANs 1– 4094.  |
| Default VLAN (for access ports)                               | VLAN 1 (Layer 2 interfaces only).   |
| Native VLAN (for IEEE 802.1Q trunks)                          | VLAN 1 (Layer 2 interfaces only).   |
| VLAN trunking   | Switchport mode dynamic auto (supports DTP) (Layer 2 interfaces only).  |
| Port enable state   | All ports are enabled.  |
| Port description  | None defined.   |
| Speed   | Autonegotiate. (Not supported on the 10-Gigabit interfaces.)  |
| Duplex mode   | Autonegotiate. (Not supported on the 10-Gigabit interfaces.)  |
| Flow control  | Flow control is set to <b>receive: off</b> . It is always off for sent packets.   |
| EtherChannel (PAgP)   | Disabled on all Ethernet ports.   |
| Port blocking (unknown multicast and unknown unicast traffic) | Disabled (not blocked) (Layer 2 interfaces only).   |
| Broadcast, multicast, and unicast storm control               | Disabled.   |
| Protected port  | Disabled (Layer 2 interfaces only).   |
| Port security   | Disabled (Layer 2 interfaces only).   |
| Port Fast   | Disabled.   |
| Auto-MDIX   | Enabled.<br><br><b>Note</b> The switch might not support a pre-standard powered device—such as Cisco IP phones and access points that do not fully support IEEE 802.3af—if that powered device is connected to the switch through a crossover cable. This is regardless of whether auto-MIDX is enabled on the switch port. |
| Power over Ethernet (PoE)                                     | Enabled (auto).   |

## Layer 3 Interfaces



---

**Note** Layer 3 interfaces are not supported on switches running the LAN Base image.

---

The switch supports these types of Layer 3 interfaces:

- SVIs: You should configure SVIs for any VLANs for which you want to route traffic. SVIs are created when you enter a VLAN ID following the **interface vlan** global configuration command. To delete an SVI, use the **no interface vlan** global configuration command. You cannot delete interface VLAN 1.



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**Note** When you create an SVI, it does not become active until it is associated with a physical port.

---

When configuring SVIs, you can also configure SVI autostate exclude on a port in the SVI to exclude that port from being included in determining SVI line-state status.

- Routed ports: Routed ports are physical ports configured to be in Layer 3 mode by using the **no switchport** interface configuration command.
- Layer 3 EtherChannel ports: EtherChannel interfaces made up of routed ports.

A Layer 3 switch can have an IP address assigned to each routed port and SVI.

There is no defined limit to the number of SVIs and routed ports that can be configured in a switch or in a switch stack. However, the interrelationship between the number of SVIs and routed ports and the number of other features being configured might have an impact on CPU usage because of hardware limitations. If the switch is using its maximum hardware resources, attempts to create a routed port or SVI have these results:

- If you try to create a new routed port, the switch generates a message that there are not enough resources to convert the interface to a routed port, and the interface remains as a switchport.
- If you try to create an extended-range VLAN, an error message is generated, and the extended-range VLAN is rejected.
- If the switch is notified by VLAN Trunking Protocol (VTP) of a new VLAN, it sends a message that there are not enough hardware resources available and shuts down the VLAN. The output of the **show vlan** user EXEC command shows the VLAN in a suspended state.
- If the switch attempts to boot up with a configuration that has more VLANs and routed ports than hardware can support, the VLANs are created, but the routed ports are shut down, and the switch sends a message that this was due to insufficient hardware resources.

All Layer 3 interfaces require an IP address to route traffic. This procedure shows how to configure an interface as a Layer 3 interface and how to assign an IP address to an interface.



**Note** If the physical port is in Layer 2 mode (the default), you must enter the **no switchport** interface configuration command to put the interface into Layer 3 mode. Entering a **no switchport** command disables and then re-enables the interface, which might generate messages on the device to which the interface is connected. Furthermore, when you put an interface that is in Layer 2 mode into Layer 3 mode, the previous configuration information related to the affected interface might be lost, and the interface is returned to its default configuration

#### Related Topics

[Configuring Layer 3 Interfaces](#), on page 23

[Configuring SVI Autostate Exclude](#), on page 25

## Cisco eXpandable Power System 2200

The Cisco eXpandable Power System (XPS) 2200 is a standalone power system that you can connect to the stacking-capable or nonstacking-capable switches. The XPS 2200 can provide backup power to connected devices that experience a power supply failure or, in power stack, it can supply additional power to the power stack budget.

The XPS 2200 power ports and internal power supplies can operate in redundant power supply (RPS) mode or stack power (SP) mode. Stack-power mode is used only on stacking-capable switches in a power stack. With no XPS, a power stack operates in ring topology with a maximum of four switches in the stack. If you merge two stacks, the total number of switches cannot exceed four. When an XPS is in the power stack, you can connect up to nine switches in the stack plus the XPS, providing power budgets to power stack members similar to stack-power ring topology operation.

All stacking-capable switches connected to an XPS on SP ports are part of the same power stack, and all power from the XPS and the switch is shared across all switches in the stack. Power sharing is the default mode, but the XPS supports the same stack power modes that are supported in a ring topology (strict and nonstrict power-sharing or redundant modes).

#### Related Topics

[Configuring System Names](#), on page 28

[Configuring XPS Ports](#), on page 29

[Configuring XPS Power Supplies](#), on page 31

## How to Configure Interface Characteristics

### Configuring Interfaces

These general instructions apply to all interface configuration processes.

**Procedure**

|               | <b>Command or Action</b>   | <b>Purpose</b>  |
|---------------|--|---|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br>Switch> <b>enable</b>  | Enables privileged EXEC mode. Enter your password if prompted.  |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br>Switch# <b>configure terminal</b>  | Enters the global configuration mode.   |
| <b>Step 3</b> | <b>interface</b><br><b>Example:</b><br>Switch(config)# <b>interface</b><br><b>gigabitethernet1/0/1</b><br>Switch(config-if)# | Identifies the interface type, the switch number (only on stacking-capable switches), and the number of the connector.<br><br><b>Note</b> You do not need to add a space between the interface type and the interface number. For example, in the preceding line, you can specify either <b>gigabitethernet 1/0/1</b> , <b>gigabitethernet1/0/1</b> , <b>gi 1/0/1</b> , or <b>gi1/0/1</b> . |
| <b>Step 4</b> | Follow each <b>interface</b> command with the interface configuration commands that the interface requires.                  | Defines 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 <b>end</b> to return to privileged EXEC mode.  |
| <b>Step 5</b> | <b>interface range</b> or <b>interface range macro</b>   | (Optional) Configures a range of interfaces.<br><br><b>Note</b> Interfaces configured in a range must be the same type and must be configured with the same feature options.  |
| <b>Step 6</b> | <b>show interfaces</b>   | Displays 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.   |

**Related Topics**

[Interface Types](#), on page 1

## Configuring a Range of Interfaces

To configure multiple interfaces with the same configuration parameters, use the **interface range** global configuration command. 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.

### Procedure

|               | Command or Action  | Purpose   |
|---------------|--|---|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br>Switch> <b>enable</b>  | Enables privileged EXEC mode. Enter your password if prompted.  |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br>Switch# <b>configure terminal</b>  | Enters global configuration mode.   |
| <b>Step 3</b> | <b>interface range</b> { <i>port-range</i>   <b>macro</b> <i>macro_name</i> }<br><b>Example:</b><br>Switch(config)# <b>interface range macro</b> | Specifies the range of interfaces (VLANs or physical ports) to be configured, and enter interface-range configuration mode. <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, on page 18</a>.</li> <li>In a comma-separated <i>port-range</i>, you must enter the interface type for each entry and enter spaces before and after the comma.</li> <li>In a hyphen-separated <i>port-range</i>, you do not need to re-enter the interface type, but you must enter a space before the hyphen.</li> </ul> <p><b>Note</b> Use the normal configuration commands to apply the configuration parameters to all interfaces in the range. Each command is executed as it is entered.</p> |
| <b>Step 4</b> | <b>end</b><br><b>Example:</b>  | Returns to privileged EXEC mode.  |

|               | Command or Action   | Purpose  |
|---------------|---|--|
|               | <code>Switch(config)# end</code>  |  |
| <b>Step 5</b> | <b>show interfaces</b> [ <i>interface-id</i> ]<br><b>Example:</b><br><code>Switch# show interfaces</code>               | Verifies the configuration of the interfaces in the range. |
| <b>Step 6</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br><code>Switch# copy running-config startup-config</code> | (Optional) Saves your entries in the configuration file.   |

**Related Topics**

[Interface Range Configuration Guidelines](#), on page 10

## 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.

**Procedure**

|               | Command or Action  | Purpose  |
|---------------|--|--|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br><code>Switch&gt; enable</code>   | Enables privileged EXEC mode. Enter your password if prompted.   |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br><code>Switch# configure terminal</code>  | Enters global configuration mode.  |
| <b>Step 3</b> | <b>define interface-range</b> <i>macro_name</i><br><i>interface-range</i><br><b>Example:</b><br><code>Switch(config)# define interface-range enet_list gigabitethernet1/0/1 - 2</code> | Defines 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.</li> </ul> |

|               | Command or Action   | Purpose  |
|---------------|---|--|
|               |   | <ul style="list-style-type: none"> <li>Each <i>interface-range</i> must consist of the same port type.</li> </ul> <p><b>Note</b> Before you can use the <b>macro</b> keyword in the <b>interface range macro</b> global configuration command string, you must use the <b>define interface-range</b> global configuration command to define the macro.</p> |
| <b>Step 4</b> | <b>interface range macro</b> <i>macro_name</i><br><b>Example:</b><br><pre>Switch(config)# interface range macro enet_list</pre> | Selects the interface range to be configured using the values saved in the interface-range macro called <i>macro_name</i> .<br>You can now use the normal configuration commands to apply the configuration to all interfaces in the defined macro.  |
| <b>Step 5</b> | <b>end</b><br><b>Example:</b><br><pre>Switch(config)# end</pre>   | Returns to privileged EXEC mode.   |
| <b>Step 6</b> | <b>show running-config   include define</b><br><b>Example:</b><br><pre>Switch# show running-config   include define</pre>       | Shows the defined interface range macro configuration.   |
| <b>Step 7</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br><pre>Switch# copy running-config startup-config</pre>           | (Optional) Saves your entries in the configuration file.   |

**Related Topics**

[Interface Range Configuration Guidelines](#), on page 10

# Configuring Ethernet Interfaces

## Setting the Interface Speed and Duplex Parameters

### Procedure

|               | Command or Action  | Purpose   |
|---------------|--|---|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br><pre>Switch&gt; enable</pre>   | Enables privileged EXEC mode. Enter your password if prompted.  |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br><pre>Switch# configure terminal</pre>  | Enters global configuration mode.   |
| <b>Step 3</b> | <b>interface <i>interface-id</i></b><br><b>Example:</b><br><pre>Switch(config)# interface gigabitethernet1/0/3</pre>   | Specifies the physical interface to be configured, and enter interface configuration mode.  |
| <b>Step 4</b> | <b>speed {10   100   1000   2500   5000   10000   auto [10   100   1000   2500   5000   10000]   nonegotiate}</b><br><b>Example:</b><br><pre>Switch(config-if)# speed 10</pre> | Enter the appropriate speed parameter for the interface: <ul style="list-style-type: none"> <li>• Enter <b>10, 100, 1000 2500, 5000, or 10000</b> to set a specific speed for the interface.</li> <li>• Enter <b>auto</b> to enable the interface to autonegotiate speed with the connected device. If you specify a speed and also set the <b>auto</b> keyword, the port autonegotiates only at the specified speeds.</li> <li>• The <b>nonegotiate</b> keyword is available only for SFP module ports. SFP module ports operate only at 1000 Mb/s but can be configured to not negotiate if connected to a device that does not support autonegotiation.</li> </ul> |
| <b>Step 5</b> | <b>duplex {auto   full   half}</b><br><b>Example:</b><br><pre>Switch(config-if)# duplex half</pre>   | This command is not available on a 10-Gigabit Ethernet interface.<br><br>Enter the duplex parameter for the interface.<br><br>Enable half-duplex mode (for interfaces operating only at 10 or 100 Mb/s). You cannot   |

|               | Command or Action  | Purpose  |
|---------------|--|--|
|               |  | configure half-duplex mode for interfaces operating at 1000 Mb/s.<br><br>You can configure the duplex setting when the speed is set to <b>auto</b> . |
| <b>Step 6</b> | <b>end</b><br><br><b>Example:</b><br><br>Switch(config-if)# <b>end</b>   | Returns to privileged EXEC mode.   |
| <b>Step 7</b> | <b>show interfaces</b> <i>interface-id</i><br><br><b>Example:</b><br><br>Switch# <b>show interfaces</b><br><b>gigabitethernet1/0/3</b> | Displays the interface speed and duplex mode configuration.  |
| <b>Step 8</b> | <b>copy running-config startup-config</b><br><br><b>Example:</b><br><br>Switch# <b>copy running-config</b><br><b>startup-config</b>    | (Optional) Saves your entries in the configuration file.   |
| <b>Step 9</b> | <b>copy running-config startup-config</b><br><br><b>Example:</b><br><br>Switch# <b>copy running-config</b><br><b>startup-config</b>    | (Optional) Saves your entries in the configuration file.   |

**Related Topics**

[Speed and Duplex Configuration Guidelines](#), on page 11

**Configuring IEEE 802.3x Flow Control****Procedure**

|               | Command or Action   | Purpose                          |
|---------------|---|----------------------------------|
| <b>Step 1</b> | <b>configure terminal</b><br><br><b>Example:</b><br><br>Switch# <b>configure terminal</b> | Enters global configuration mode |

|               | Command or Action  | Purpose  |
|---------------|--|--|
| <b>Step 2</b> | <b>interface</b> <i>interface-id</i><br><b>Example:</b><br><pre>Switch(config)# interface gigabitethernet1/0/1</pre>         | Specifies the physical interface to be configured, and enter interface configuration mode. |
| <b>Step 3</b> | <b>flowcontrol</b> {receive} {on   off   desired}<br><b>Example:</b><br><pre>Switch(config-if)# flowcontrol receive on</pre> | Configures the flow control mode for the port.   |
| <b>Step 4</b> | <b>end</b><br><b>Example:</b><br><pre>Switch(config-if)# end</pre>   | Returns to privileged EXEC mode.   |
| <b>Step 5</b> | <b>show interfaces</b> <i>interface-id</i><br><b>Example:</b><br><pre>Switch# show interfaces gigabitethernet1/0/1</pre>     | Verifies the interface flow control settings.  |
| <b>Step 6</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br><pre>Switch# copy running-config startup-config</pre>        | (Optional) Saves your entries in the configuration file.                                   |

**Related Topics**

[IEEE 802.3x Flow Control](#), on page 12

**Adding a Description for an Interface****Procedure**

|               | Command or Action  | Purpose  |
|---------------|--|--|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br><pre>Switch&gt; enable</pre> | Enables privileged EXEC mode. Enter your password if prompted. |

|               | Command or Action  | Purpose   |
|---------------|--|---|
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br><br>Switch# <b>configure terminal</b>                                  | Enters global configuration mode.   |
| <b>Step 3</b> | <b>interface <i>interface-id</i></b><br><b>Example:</b><br><br>Switch(config)# <b>interface gigabitethernet1/0/2</b>   | Specifies the interface for which you are adding a description, and enter interface configuration mode. |
| <b>Step 4</b> | <b>description <i>string</i></b><br><b>Example:</b><br><br>Switch(config-if)# <b>description Connects to Marketing</b> | Adds a description (up to 240 characters) for an interface.   |
| <b>Step 5</b> | <b>end</b><br><b>Example:</b><br><br>Switch(config-if)# <b>end</b>   | Returns to privileged EXEC mode.  |
| <b>Step 6</b> | <b>show interfaces <i>interface-id</i> description</b>   | Verifies your entry.  |
| <b>Step 7</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br><br>Switch# <b>copy running-config startup-config</b>  | (Optional) Saves your entries in the configuration file.  |

**Related Topics**

[Interface Range Configuration Guidelines](#), on page 10

## Configuring Layer 3 Interfaces

**Procedure**

|               | Command or Action                | Purpose  |
|---------------|----------------------------------|--|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b> | Enables privileged EXEC mode. Enter your password if prompted. |

|               | Command or Action  | Purpose  |
|---------------|--|--|
|               | Switch> <b>enable</b>  |  |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br>Switch# <b>configure terminal</b>  | Enters global configuration mode.  |
| <b>Step 3</b> | <b>interface</b> { <b>gigabitethernet</b> <i>interface-id</i> }   { <b>vlan</b> <i>vlan-id</i> }   { <b>port-channel</b> <i>port-channel-number</i> }<br><b>Example:</b><br>Switch(config)# <b>interface</b> <b>gigabitethernet1/0/2</b> | Specifies the interface to be configured as a Layer 3 interface, and enter interface configuration mode. |
| <b>Step 4</b> | <b>no switchport</b><br><b>Example:</b><br>Switch(config-if)# <b>no switchport</b>   | For physical ports only, enters Layer 3 mode.  |
| <b>Step 5</b> | <b>ip address</b> <i>ip_address subnet_mask</i><br><b>Example:</b><br>Switch(config-if)# <b>ip address</b> <b>192.20.135.21 255.255.255.0</b>  | Configures the IP address and IP subnet.   |
| <b>Step 6</b> | <b>no shutdown</b><br><b>Example:</b><br>Switch(config-if)# <b>no shutdown</b>   | Enables the interface.   |
| <b>Step 7</b> | <b>end</b><br><b>Example:</b><br>Switch(config-if)# <b>end</b>   | Returns to privileged EXEC mode.   |
| <b>Step 8</b> | <b>show interfaces</b> [ <i>interface-id</i> ]   | Verifies the configuration.  |
| <b>Step 9</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br>Switch# <b>copy running-config</b> <b>startup-config</b>   | (Optional) Saves your entries in the configuration file.   |

**Related Topics**

[Layer 3 Interfaces](#), on page 14

## Configuring SVI Autostate Exclude

**Procedure**

|               | <b>Command or Action</b>  | <b>Purpose</b>   |
|---------------|---|--|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br>Switch> <b>enable</b>   | Enables privileged EXEC mode. Enter your password if prompted.   |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br>Switch# <b>configure terminal</b>   | Enters global configuration mode.  |
| <b>Step 3</b> | <b>interface <i>interface-id</i></b><br><b>Example:</b><br>Switch(config)# <b>interface</b><br><b>gigabitethernet1/0/2</b>  | Specifies a Layer 2 interface (physical port or port channel), and enter interface configuration mode. |
| <b>Step 4</b> | <b>switchport autostate exclude</b><br><b>Example:</b><br>Switch(config-if)# <b>switchport autostate</b><br><b>exclude</b>  | Excludes the access or trunk port when defining the status of an SVI line state (up or down)           |
| <b>Step 5</b> | <b>end</b><br><b>Example:</b><br>Switch(config-if)# <b>end</b>  | Returns to privileged EXEC mode.   |
| <b>Step 6</b> | <b>show running config interface <i>interface-id</i></b>  | (Optional) Shows the running configuration. Verifies the configuration.                                |
| <b>Step 7</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br>Switch# <b>copy running-config</b><br><b>startup-config</b> | (Optional) Saves your entries in the configuration file.   |

**Related Topics**

[Layer 3 Interfaces](#), on page 14

## Configuring the Console Media Type

Follow these steps to set the console media type to RJ-45. If you configure the console as RJ-45, USB console operation is disabled, and input comes only through the RJ-45 connector.

This configuration applies to all switches in a stack.

**Procedure**

|               | Command or Action   | Purpose  |
|---------------|---|--|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br><pre>Switch&gt; enable</pre>  | Enables privileged EXEC mode. Enter your password if prompted.   |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br><pre>Switch# configure terminal</pre>                                 | Enters the global configuration mode.  |
| <b>Step 3</b> | <b>line console 0</b><br><b>Example:</b><br><pre>Switch(config)# line console 0</pre>                                 | Configures the console and enters line configuration mode.   |
| <b>Step 4</b> | <b>media-type rj45</b><br><b>Example:</b><br><pre>Switch(config-line)# media-type rj45</pre>                          | Configures the console media type to be only RJ-45 port. If you do not enter this command and both types are connected, the USB port is used by default. |
| <b>Step 5</b> | <b>end</b><br><b>Example:</b><br><pre>Switch(config)# end</pre>   | Returns to privileged EXEC mode.   |
| <b>Step 6</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br><pre>Switch# copy running-config startup-config</pre> | (Optional) Saves your entries in the configuration file.   |

**Related Topics**

[Using the Switch USB Ports](#), on page 6

## Configuring the USB Inactivity Timeout

The configurable inactivity timeout reactivates the RJ-45 console port if the USB console port is activated but no input activity occurs on it for a specified time period. When the USB console port is deactivated due to a timeout, you can restore its operation by disconnecting and reconnecting the USB cable.



**Note** The configured inactivity timeout applies to all switches in a stack. However, a timeout on one switch does not cause a timeout on other switches in the stack.

**Procedure**

|               | Command or Action   | Purpose  |
|---------------|---|--|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br>Switch> <b>enable</b>   | Enables privileged EXEC mode. Enter your password if prompted.   |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br>Switch# <b>configure terminal</b>   | Enters the global configuration mode.  |
| <b>Step 3</b> | <b>line console 0</b><br><b>Example:</b><br>Switch(config)# <b>line console 0</b>   | Configures the console and enters line configuration mode.   |
| <b>Step 4</b> | <b>usb-inactivity-timeout</b> <i>timeout-minutes</i><br><b>Example:</b><br>Switch(config-line)#<br><b>usb-inactivity-timeout 30</b> | Specify an inactivity timeout for the console port. The range is 1 to 240 minutes. The default is to have no timeout configured. |
| <b>Step 5</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br>Switch# <b>copy running-config startup-config</b>                   | (Optional) Saves your entries in the configuration file.   |

**Related Topics**

[Using the Switch USB Ports](#), on page 6

## How to Configure the XPS 2200

You can configure the XPS from any switch connected to an XPS port. If you enter XPS configuration commands on more than one switch, the last configuration applied takes effect. Only the switch and port name are saved in the switch configuration file.

### Configuring System Names

**Procedure**

|               | Command or Action  | Purpose  |
|---------------|--|--|
| <b>Step 1</b> | <b>enable</b><br><br><b>Example:</b><br><br>Switch> <b>enable</b>                  | Enables privileged EXEC mode. Enter your password if prompted.   |
| <b>Step 2</b> | <b>configure terminal</b>  | Enters global configuration mode.  |
| <b>Step 3</b> | <b>power xps <i>switch-number</i> name {<i>name</i>   serialnumber}</b>            | <p><b>Note</b> The <i>switch-number</i> appears only on Catalyst switches and represents the switch number in the data stack, a value from 1 to 9.</p> <p>Configures a name for the XPS 2200 system.</p> <ul style="list-style-type: none"> <li>• <i>name</i>—Enter a name for the XPS 2000 port. The name can have up to 20 characters.</li> <li>• <b>serialnumber</b>—Use the serial number of the XPS 2200 as the system name.</li> </ul>   |
| <b>Step 4</b> | <b>power xps <i>switch-number</i> port {<i>name</i>   hostname   serialnumber}</b> | <p><b>Note</b> The <i>switch-number</i> appears only on Catalyst switches and represents the switch number in the data stack, a value from 1 to 9.</p> <p>Configures a name for an XPS 2200 port connected to the switch.</p> <ul style="list-style-type: none"> <li>• <i>name</i>—Enter a name for the XPS 2000 port.</li> <li>• <b>serialnumber</b>—Use the serial number of the switch connected to the port.</li> <li>• <b>hostname</b>—Use the hostname of the switch connected to the port.</li> </ul> |

|               | Command or Action   | Purpose  |
|---------------|---|--|
| <b>Step 5</b> | <code>end</code>  | Returns to privileged EXEC mode.                         |
| <b>Step 6</b> | <code>show env xps system</code>  | Verifies the configured name of the system and ports.    |
| <b>Step 7</b> | <b>copy running-config startup-config</b><br><b>Example:</b><br><br><pre>Switch# copy running-config startup-config</pre> | (Optional) Saves your entries in the configuration file. |

**Related Topics**

[Cisco eXpandable Power System 2200](#), on page 15

**Configuring XPS Ports****Procedure**

|               | Command or Action  | Purpose   |
|---------------|--|---|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br><br><pre>Switch&gt; enable</pre>                           | Enables privileged EXEC mode. Enter your password if prompted.  |
| <b>Step 2</b> | <b>power xps <i>switch-number</i> port {<i>number</i>   connected} mode {disable   enable}</b> | <p><b>Note</b> The <i>switch-number</i> appears only on Catalyst switches and represents the switch number in the data stack, a value from 1 to 9.</p> <p>Sets the port to be enabled or disabled.</p> <ul style="list-style-type: none"> <li>• <i>number</i>—Enter the XPS 2200 port number. The range is 1 to 9.</li> <li>• <b>connected</b>—Enter this keyword if you do not know the port number to which the switch is connected.</li> <li>• <b>mode disable</b>—Disable (shut down) the XPS port.</li> </ul> <p><b>Note</b> Disabling an XPS port is like removing the cable and appears the same in the <b>show</b> command outputs. If the physical cable is connected, you can still use the <b>enable</b> keyword to enable the port.</p> |

|               | Command or Action   | Purpose  |
|---------------|---|--|
|               |   | <ul style="list-style-type: none"> <li>• <b>mode enable</b>—Enable the XPS port. This is the default.</li> </ul>   |
| <b>Step 3</b> | <p><b>power xps</b> <i>switch-number</i> <b>port</b> {<i>number</i>   <b>connected</b>} <b>role</b> {<b>auto</b>   <b>rps</b>}</p>  | <p><b>Note</b> The <i>switch-number</i> represents the switch number in the data stack, a value from 1 to 9.</p> <p>Sets the role of the XPS port.</p> <ul style="list-style-type: none"> <li>• <b>role auto</b>—The port mode is determined by the switch connected to the port. This is the default. When a Catalyst 3560-X switch or Catalyst 3750-X switch running the LAN base image is connected, the mode is RPS. When a Catalyst-3750-X switch is connected, the mode is stack power (SP).</li> <li>• <b>role RPS</b>—The XPS acts as a back up if the switch power supply fails. At least one RPS power supply must be in RPS mode for this configuration.</li> </ul> |
| <b>Step 4</b> | <p><b>power xps</b> <i>switch-number</i> <b>port</b> {<i>number</i>   <b>connected</b>} <b>priority</b> <i>port-priority</i></p> <p><b>Example:</b></p> <pre>Switch</pre> | <p><b>Note</b> The <i>switch-number</i> represents the switch number in the data stack, a value from 1 to 9.</p> <p>Sets the RPS priority of the port, where higher priority ports take precedence over low priority ports if multiple power supplies fail. This command takes effect only when the port mode is RPS. When the port mode is stack power, you set priority by using the stack power commands.</p> <ul style="list-style-type: none"> <li>• <b>priority</b> <i>port-priority</i>—Set the RPS priority of the port. The range is 1 to 9, with 1 being the highest priority. The default priority is the XPS port number.</li> </ul>                               |
| <b>Step 5</b> | <b>show env xps port</b>  | Verifies the XPS configuration of the port.  |

**Related Topics**

[Cisco eXpandable Power System 2200](#), on page 15

## Configuring XPS Power Supplies

### Procedure

|               | Command or Action  | Purpose   |
|---------------|--|---|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br>Switch> <b>enable</b>            | Enables privileged EXEC mode. Enter your password if prompted.  |
| <b>Step 2</b> | <b>power xps <i>switch-number</i> supply {A   B} mode {rps   sp}</b> | <p><b>Note</b> The <i>switch-number</i> represents the switch number in the data stack, a value from 1 to 9.</p> <p>Sets the XPS power supply mode.</p> <ul style="list-style-type: none"> <li>• <b>supply {A   B}</b>—Select the power supply to configure. Power supply A is on the left (labeled PS1) and power supply B (PS2) is on the right.</li> <li>• <b>mode rps</b>—Set the power supply mode to RPS, to back up connected switches. This is the default setting for power supply A (PS1).</li> <li>• <b>mode sp</b>—Set the power supply mode to stack power (SP), to participate in the power stack. This is the default setting for power supply B (PS2).</li> </ul> |
| <b>Step 3</b> | <b>power xps <i>switch-number</i> supply {A   B} {on   off}</b>      | <p><b>Note</b> The <i>switch-number</i> represents the switch number in the data stack, a value from 1 to 9.</p> <p>Sets the XPS power supply to be on or off. The default is for both power supplies to be on.</p>   |
| <b>Step 4</b> | <b>end</b>   | Returns to privileged EXEC mode.  |
| <b>Step 5</b> | <b>show env xps power</b>  | Displays the status of the XPS power supplies.  |

### Related Topics

[Cisco eXpandable Power System 2200](#), on page 15

# Monitoring Interface Characteristics

## Monitoring Interface Status

Commands entered at the privileged EXEC prompt display information about the interface, including the versions of the software and the hardware, the configuration, and statistics about the interfaces.

**Table 2: Show Commands for Interfaces**

| Command  | Purpose   |
|--|---|
| <b>show env power switch</b> <i>switch-number</i>                                | (Optional) Displays the status of the internal power supplies for each switch in the stack or for the specified switch. The range is 1 to 9, depending on the switch member numbers in the stack. |
| <b>show env rps</b>  | Displays whether a redundant power system (RPS) is connected to the switch.   |
| <b>show env rps detail</b>   | (Optional) Displays the details about the RPSs that are connected to the switch or switch stack.  |
| <b>show env rps switch</b> <i>switch-number</i>                                  | (Optional) Displays the RPSs that are connected to each switch in the stack or to the specified switch. The range is 1 to 9, depending on the switch member numbers in the stack.                 |
| <b>show interfaces</b> <i>interface-id</i> <b>status</b> [ <b>err-disabled</b> ] | Displays interface status or a list of interfaces in the error-disabled state.  |
| <b>show interfaces</b> [ <i>interface-id</i> ] <b>switchport</b>                 | Displays administrative and operational status of switching (nonrouting) ports. You can use this command to find out if a port is in routing or in switching mode.                                |
| <b>show interfaces</b> [ <i>interface-id</i> ] <b>description</b>                | Displays the description configured on an interface or all interfaces and the interface status.   |
| <b>show ip interface</b> [ <i>interface-id</i> ]                                 | Displays the usability status of all interfaces configured for IP routing or the specified interface.   |
| <b>show interface</b> [ <i>interface-id</i> ] <b>stats</b>                       | Displays the input and output packets by the switching path for the interface.  |
| <b>show interfaces</b> <i>interface-id</i>                                       | (Optional) Displays speed and duplex on the interface.  |
| <b>show interfaces transceiver dom-supported-list</b>                            | (Optional) Displays Digital Optical Monitoring (DOM) status on the connect SFP modules.   |
| <b>show interfaces transceiver properties</b>                                    | (Optional) Displays temperature, voltage, or amount of current on the interface.  |

| Command   | Purpose   |
|---|---|
| <b>show interfaces</b> [ <i>interface-id</i> ]<br>[ <b>{transceiver properties   detail}</b> ] <i>module number</i> | Displays physical and operational status about an SFP module.   |
| <b>show running-config interface</b><br>[ <i>interface-id</i> ]   | Displays the running configuration in RAM for the interface.  |
| <b>show version</b>   | Displays the hardware configuration, software version, the names and sources of configuration files, and the boot images. |
| <b>show controllers ethernet-controller</b><br><i>interface-id phy</i>  | Displays the operational state of the auto-MDIX feature on the interface.   |
| <b>show power inline</b> <i>interface-id</i><br><b> moduleswitch-number</b>   | Displays PoE status for a switch or switch stack, for an interface, or for a specific switch in the stack.                |
| <b>show power inline consumption</b>  | Displays power consumption data.  |
| <b>show power inline police</b>   | Displays power policing data.   |

## Clearing and Resetting Interfaces and Counters

Table 3: Clear Commands for Interfaces

| Command   | Purpose   |
|---|---|
| <b>clear counters</b> [ <i>interface-id</i> ]                               | Clears interface counters.                                |
| <b>clear interface</b> <i>interface-id</i>                                  | Resets the hardware logic on an interface.                |
| <b>clear line</b> [ <i>number</i>   <b>console 0</b>   <i>vtty number</i> ] | Resets the hardware logic on an asynchronous serial line. |



**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 interface** privileged EXEC command.

## 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.

## Procedure

|               | Command or Action   | Purpose  |
|---------------|---|--|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br>Switch> <b>enable</b>   | Enables privileged EXEC mode. Enter your password if prompted. |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br>Switch# <b>configure terminal</b>   | Enters global configuration mode.                              |
| <b>Step 3</b> | <b>interface {vlan <i>vlan-id</i>}   {<br/>           gigabitethernet<i>interface-id</i>}   {port-channel<br/> <i>port-channel-number</i>}</b><br><b>Example:</b><br>Switch(config)# <b>interface<br/>           gigabitethernet1/0/2</b> | Selects the interface to be configured.                        |
| <b>Step 4</b> | <b>shutdown</b><br><b>Example:</b><br>Switch(config-if)# <b>shutdown</b>  | Shuts down an interface.                                       |
| <b>Step 5</b> | <b>no shutdown</b><br><b>Example:</b><br>Switch(config-if)# <b>no shutdown</b>  | Restarts an interface.   |
| <b>Step 6</b> | <b>end</b><br><b>Example:</b><br>Switch(config-if)# <b>end</b>  | Returns to privileged EXEC mode.                               |
| <b>Step 7</b> | <b>show running-config</b><br><b>Example:</b><br>Switch# <b>show running-config</b>   | Verifies your entries.   |

# Configuration Examples for Interface Characteristics

## Adding a Description to an Interface: Example

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTRL/Z.
Switch(config)# interface gigabitethernet1/0/2
Switch(config-if)# description Connects to Marketing
Switch(config-if)# end
Switch# show interfaces gigabitethernet1/0/2 description
Interface Status      Protocol Description
Gi1/0/2    admin down      down      Connects to Marketing
```

## Identifying Interfaces on a Stack-Capable Switch: Examples

To configure 10/100/1000 port 4 on a standalone switch, enter this command:

```
Switch(config)# interface gigabitethernet1/0/4
```

## Configuring a Range of Interfaces: Examples

This example shows how to use the **interface range** global configuration command to set the speed to 100 Mb/s on ports 1 to 4 on switch 1:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet1/0/1 - 4
Switch(config-if-range)# speed 100
```

This example shows how to use a comma to add different interface type strings to the range to enable Gigabit Ethernet ports 1 to 3 and 10-Gigabit Ethernet ports 1 and 2 to receive flow-control pause frames:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet1/0/1 - 3 , tengigabitethernet1/0/1 - 2
Switch(config-if-range)# flowcontrol receive on
```

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 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: Examples

This example shows how to define an interface-range named *enet\_list* to include ports 1 and 2 on switch 1 and to verify the macro configuration:

```
Switch# configure terminal
Switch(config)# define interface-range enet_list gigabitethernet1/0/1 - 2
Switch(config)# end
Switch# show running-config | include define
define interface-range enet_list GigabitEthernet1/0/1 - 2
```

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

```
Switch# configure terminal
Switch(config)# define interface-range macro1 gigabitethernet1/0/1 - 2, gigabitethernet1/0/5
- 7, tengigabitethernet1/0/1 -2
Switch(config)# end
```

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 was deleted.

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

## Setting Interface Speed and Duplex Mode: Example

This example shows how to set the interface speed to 100 Mb/s and the duplex mode to half on a 10/100/1000 Mb/s port:

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/3
Switch(config-if)# speed 10
Switch(config-if)# duplex half
```

This example shows how to set the interface speed to 100 Mb/s on a 10/100/1000 Mb/s port:

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/2
Switch(config-if)# speed 100
```

## Configuring Layer 3 Interfaces: Example

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet1/0/2
Switch(config-if)# no switchport
Switch(config-if)# ip address 192.20.135.21 255.255.255.0
```

```
Switch(config-if)# no shutdown
```

## Configuring the Console Media Type: Example

This example disables the USB console media type and enables the RJ-45 console media type.

```
Switch# configure terminal
Switch(config)# line console 0
Switch(config-line)# media-type rj45
```

This configuration terminates any active USB console media type in the stack. A log shows that this termination has occurred. This example shows that the console on switch 1 reverted to RJ-45.

```
*Mar 1 00:25:36.860: %USB_CONSOLE-6-CONFIG_DISABLE: Console media-type USB disabled by
system configuration, media-type reverted to RJ45.
```

At this point no switches in the stack allow a USB console to have input. A log entry shows when a console cable is attached. If a USB console cable is connected to switch 2, it is prevented from providing input.

```
*Mar 1 00:34:27.498: %USB_CONSOLE-6-CONFIG_DISALLOW: Console media-type USB is disallowed
by system configuration, media-type remains RJ45. (switch-stk-2)
```

This example reverses the previous configuration and immediately activates any USB console that is connected.

```
Switch# configure terminal
Switch(config)# line console 0
Switch(config-line)# no media-type rj45
```

## Configuring the USB Inactivity Timeout: Example

This example configures the inactivity timeout to 30 minutes:

```
Switch# configure terminal
Switch(config)# line console 0
Switch(config-line)# usb-inactivity-timeout 30
```

To disable the configuration, use these commands:

```
Switch# configure terminal
Switch(config)# line console 0
Switch(config-line)# no usb-inactivity-timeout
```

If there is no (input) activity on a USB console port for the configured number of minutes, the inactivity timeout setting applies to the RJ-45 port, and a log shows this occurrence:

```
*Mar 1 00:47:25.625: %USB_CONSOLE-6-INACTIVITY_DISABLE: Console media-type USB disabled
due to inactivity, media-type reverted to RJ45.
```

At this point, the only way to reactivate the USB console port is to disconnect and reconnect the cable.

When the USB cable on the switch has been disconnected and reconnected, a log similar to this appears:

```
*Mar 1 00:48:28.640: %USB_CONSOLE-6-MEDIA_USB: Console media-type is USB.
```

## Additional References

### Error Message Decoder

| Description   | Link  |
|---|---|
| To help you research and resolve system error messages in this release, use the Error Message Decoder tool. | <a href="https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi">https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi</a> |

### MIBs

| MIB                                  | MIBs Link  |
|--------------------------------------|--|
| All supported MIBs for this release. | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br><a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a> |

### Technical Assistance

| Description   | Link  |
|---|---|
| <p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p> | <a href="http://www.cisco.com/support">http://www.cisco.com/support</a> |