



## Catalyst 2960-X Switch Hardware Installation Guide

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## Preface

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- [Document Conventions , on page ix](#)
- [Obtaining Documentation and Submitting a Service Request, on page xi](#)

## Document Conventions

This document uses the following conventions:

Convention	Description
<code>^</code> or <code>Ctrl</code>	Both the <code>^</code> symbol and <code>Ctrl</code> represent the Control ( <code>Ctrl</code> ) key on a keyboard. For example, the key combination <code>^D</code> or <code>Ctrl-D</code> means that you hold down the Control key while you press the D key. (Keys are indicated in capital letters but are not case sensitive.)
<b>bold</b> font	Commands and keywords and user-entered text appear in <b>bold</b> font.
<i>Italic</i> font	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic</i> font.
<code>Courier</code> font	Terminal sessions and information the system displays appear in <code>courier</code> font.
<b><code>Courier</code></b> font	<b><code>Courier</code></b> font indicates text that the user must enter.
<code>[x]</code>	Elements in square brackets are optional.
<code>...</code>	An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.
<code> </code>	A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.
<code>[x   y]</code>	Optional alternative keywords are grouped in brackets and separated by vertical bars.
<code>{x   y}</code>	Required alternative keywords are grouped in braces and separated by vertical bars.

Convention	Description
[x {y   z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
<>	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

### Reader Alert Conventions

This document may use the following conventions for reader alerts:



**Note** Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.



**Tip** Means *the following information will help you solve a problem*.



**Caution** Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.



**Timesaver** Means *the described action saves time*. You can save time by performing the action described in the paragraph.



#### Warning

IMPORTANT SAFETY INSTRUCTIONS  
This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

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**Obtaining Documentation and Submitting a Service Request**



# CHAPTER 1

## Product Overview

The Catalyst 2960-X family of switches are Ethernet switches to which you can connect devices such as Cisco IP Phones, Cisco Wireless Access Points, workstations, and other network devices such as servers, routers, and other switches.

Some models of the switches support stacking through the Cisco FlexStack technology. Unless otherwise noted, the term *switch* refers to a standalone switch and to a switch stack.

This chapter contains these topics:

- [Switch Models, on page 1](#)
- [Front Panel, on page 2](#)
- [Rear Panel, on page 12](#)
- [Management Options, on page 17](#)
- [Network Configurations, on page 18](#)

## Switch Models

*Table 1: Catalyst 2960-X Switch Models and Descriptions*

Switch Model	Supported Software Image	Description
Catalyst 2960X-48FPD-L	LAN Base	48 10/100/1000 Power over Ethernet Plus (PoE+) ports (PoE budget of 740 W) and 2 small form-factor pluggable (SFP)+ module slots.
Catalyst 2960X-48LPD-L <sup>1</sup>	LAN Base	48 10/100/1000 PoE+ ports (PoE budget of 370 W) and 2 SFP+ module slots.
Catalyst 2960X-24PD-L <sup>1</sup>	LAN Base	24 10/100/1000 PoE+ ports (PoE budget of 370 W) and 2 SFP+ module slots.
Catalyst 2960X-48TD-L <sup>1</sup>	LAN Base	48 10/100/1000 ports and 2 SFP+ module slots.

Switch Model	Supported Software Image	Description
Catalyst 2960X-24TD-L <sup>1</sup>	LAN Base	24 10/100/1000 ports and 2 SFP+ module slots.
Catalyst 2960X-48FPS-L <sup>1</sup>	LAN Base	48 10/100/1000 PoE+ ports (PoE budget of 740 W) and 4 SFP module slots.
Catalyst 2960X-48LPS-L <sup>1</sup>	LAN Base	48 10/100/1000 PoE+ ports (PoE budget of 370 W) and 4 SFP module slots.
Catalyst 2960X-24PS-L <sup>1</sup>	LAN Base	24 10/100/1000 PoE+ ports (PoE budget of 370 W) and 4 SFP module slots.
Catalyst 2960X-48TS-L <sup>1</sup>	LAN Base	48 10/100/1000 ports and 4 SFP module slots.
Catalyst 2960X-24TS-L <sup>1</sup>	LAN Base	24 10/100/1000 ports and 4 SFP module slots
Catalyst 2960X-48TS-LL	LAN Lite	48 10/100/1000 ports and 2 SFP module slots.
Catalyst 2960X-24TS-LL	LAN Lite	24 10/100/1000 ports and 2 SFP module slots.

<sup>1</sup> Support Cisco FlexStack technology.

<sup>2</sup> SFP+ = 10-Gigabit uplink.

<sup>3</sup> SFP = 1-Gigabit uplink.

## Front Panel

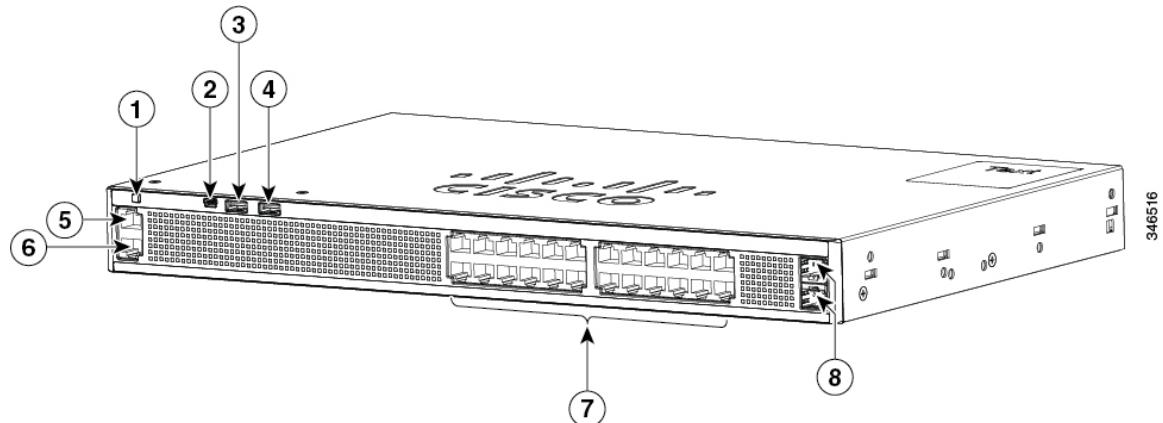
This section describes the front panel components:

- 24 or 48 downlink ports of one of these types:
  - 10/100/1000
  - 10/100/1000 PoE+
  - SFP ports
  - USB Type A connectors
  - USB mini-Type B (console) port
  - Ethernet management port
  - RJ-45 console port
  - LEDs

- Mode button

**Figure 1: Catalyst 2960X Front Panel**

The Catalyst 2960X switch is shown here as an example. Other switches have similar components.



1	Mode button	5	Ethernet management port
2	USB mini-Type B (console) port	6	RJ-45 console port
3	USB Type A port	7	10/100/1000 PoE+ ports
4	USB Type A port	8	SFP module slots

## PoE and PoE+ Ports

The ports provide PoE+ support for devices compliant with IEEE 802.3af, IEEE 802.3at, and ePoE and also provide Cisco prestandard PoE support for Cisco IP Phones and Cisco Aironet Access Points.

The maximum switch power output is either 740 W or 370 W, depending on the switch model. Intelligent power management allows flexible power allocation across all ports.

For switches with a 740 W power budget, you can budget the PoE and PoE+:

- 15.4 W of PoE output on 48 ports
- 30 W of PoE+ on 24 ports

For switches with a 370 W power budget, you can budget the PoE and PoE+:

- 15.4 W of PoE output on 24 ports
- 7.7 W of PoE output on 48 ports
- 30 W of PoE+ on 12 ports
- Total power budget can be allocated among the ports

On a per-port basis, you control whether or not a port automatically provides power when an IP phone or an access point is connected.

The PoE ports use RJ-45 connectors with Ethernet pinouts. The maximum cable length is 328 feet (100 meters). The 10BASE-T, 100BASE-TX, 1000BASE-T traffic requires Category 5, Category 5e, or Category 6 unshielded twisted pair (UTP) cable. The 10BASE-T traffic can use Category 3 or Category 4 UTP cable.

Cisco intelligent power management capabilities include enhanced power negotiation, power reservation, and per-port power policing. For information about configuring and monitoring PoE ports, see the switch software configuration guide on Cisco.com.



**Note** The output of the PoE circuit has been evaluated as a Limited Power Source (LPS) per IEC 60950-1.

## 10/100/1000 Ports

The 10/100/1000 ports use RJ-45 connectors with Ethernet pinouts. The 10BASE-T, 100BASE-TX, 1000BASE-T traffic requires Category 5 or Category 5e twisted pair (UTP) cable. The 10BASE-T traffic can use Category 3 or Category 4 UTP cable.

### Related Topics

[10/100/1000 Port Connections](#), on page 50

## Management Ports

The management ports connect the switch to a PC running Microsoft Windows or to a terminal server.

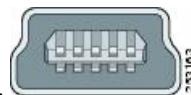
- Ethernet management port.
- RJ-45 console port (EIA/TIA-232).
- USB mini-Type B console port (5-pin connector).

The 10/100 Ethernet management port connection uses a standard RJ-45 crossover or straight-through cable. The RJ-45 console port connection uses the supplied RJ-45-to-DB-9 female cable. The USB console port connection uses a USB Type A to 5-pin mini-Type B cable. The USB console interface speeds are the same as the RJ-45 console interface speeds.

If you use the USB mini-Type B console port, the Cisco Windows USB device driver must be installed on any PC connected to the console port (for operation with Microsoft Windows). Mac OS X or Linux do not require special drivers.

The 4-pin mini-Type B connector resembles the 5-pin mini-Type B connectors. They are not compatible. Use only the 5-pin mini-Type B.

**Figure 2: USB Mini-Type B Port**



This illustration shows a 5-pin mini-Type B USB port.

With the Cisco Windows USB device driver, you can connect and disconnect the USB cable from the console port without affecting Windows HyperTerminal operations.

The console output always goes to both the RJ-45 and the USB console connectors, but the console input is active on only one of the console connectors at any one time. The USB console takes precedence over the

RJ-45 console. When a cable is connected into the USB console port, the RJ-45 console port becomes inactive. Conversely, when the USB cable is disconnected from the USB console port, the RJ-45 port becomes active.

You can use the command-line interface (CLI) to configure an inactivity timeout which reactivates the RJ-45 console if the USB console has been activated and no input activity has occurred on the USB console for a specified time.

After the USB console deactivates due to inactivity, you cannot use the CLI to reactivate it. Disconnect and reconnect the USB cable to reactivate the USB console. For information on using the CLI to configure the USB console interface, see the software guide.

## 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, and 8 GB are supported). When combined with stacking, you can upgrade other switches in the stack from an USB key inserted in any switch within the stack. Cisco IOS software provides standard file system access to the flash device: read, write, erase, and copy, as well as the ability to format the flash device with a FAT file system.

It provides you with the ability to automatically upgrade the internal flash with the USB drive's configuration and image for emergency switch recovery using USB auto-upgrade. This feature checks the internal flash for a bootable image and configuration and if either image or the configuration is not available, then the USB drive is checked for boot images and configuration. If the boot image and configuration are available, these are copied to flash for the reboot.

## SFP and SFP+ Module Slots

The switch has either two or four 1-Gigabit SFP or two 10-Gigabit SFP+ module slots. The slots marked *SFP+* support both SFP and SFP+ modules. The *SFP* slots support only the SFP modules.

For Cisco SFP and SFP+ modules documentation, including compatibility matrixes, refer to this URL: [http://www.cisco.com/en/US/products/hw/modules/ps5455/products\\_device\\_support\\_tables\\_list.html](http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html)

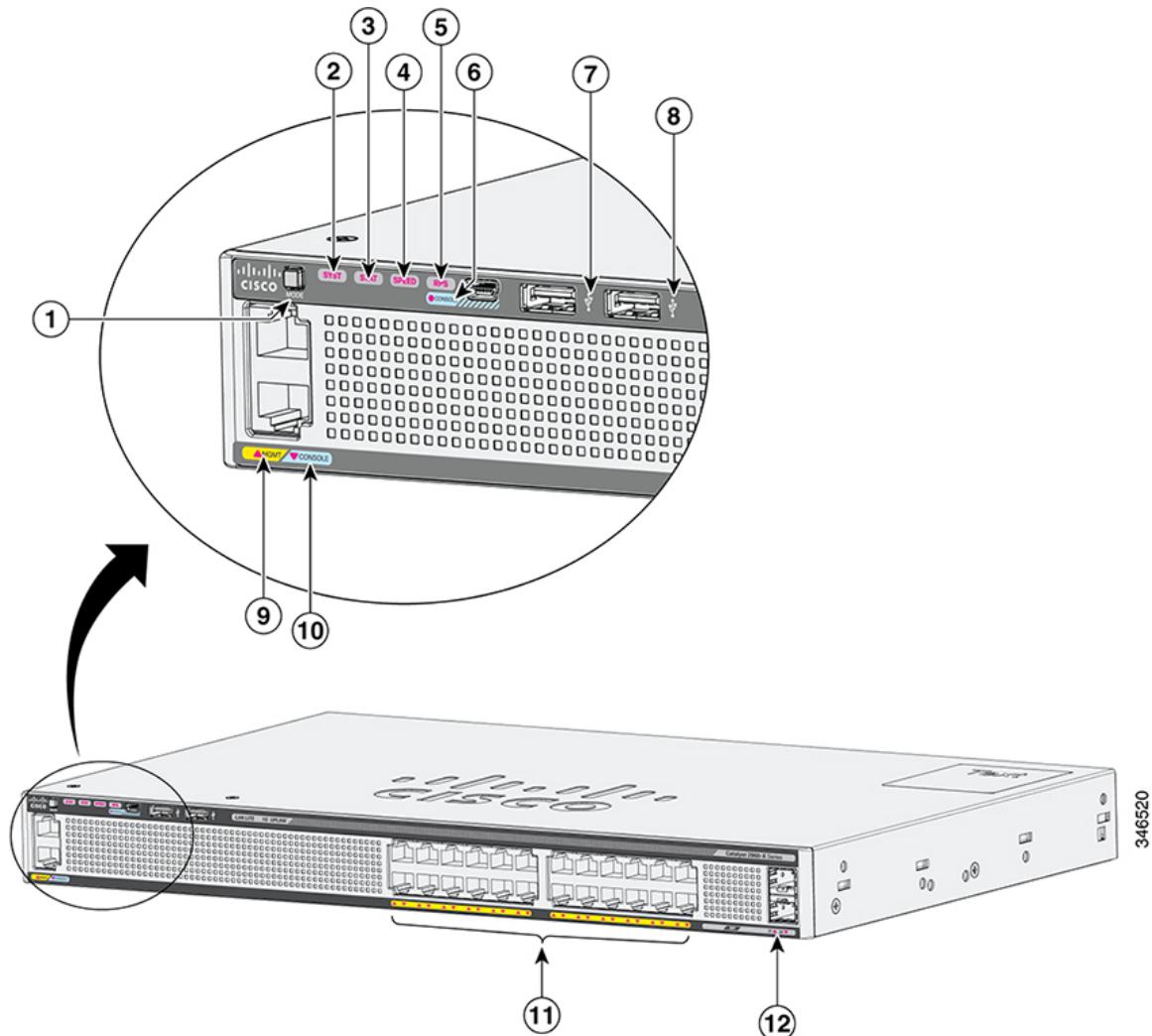
## LEDs

You can use the switch LEDs to monitor switch activity and its performance.

**Figure 3: Switch LEDs and Mode Button for the Catalyst 2960-X Switch**

This figure shows the switch LEDs and the Mode button that you use to select a port mode.

## LEDs



1	Mode button	7	USB Type A port
2	SYST LED	8	USB Type A port
3	STAT LED	9	MGMT LED
4	SPEED LED	10	CONSOLE LED
5	RPS LED <sup>4</sup>	11	Port LEDs
6	USB mini-Type B console port LED	12	SFP port LEDs

<sup>4</sup> RPS = redundant power system—only on switch models that support RPS.

## System LED

**Table 2: System LED**

Color	System Status
Off	System is not powered on.
Green	System is operating normally.
Blinking green	POST in progress.
Amber	System is receiving power but is not functioning properly.
Blinking amber	System is sleep mode.

## RPS LED

The RPS LED is only available on switch models that have an RPS port .

**Table 3: RPS LED**

Color	RPS Status
Off	RPS is off or not properly connected.
Green	RPS is connected and can provide back-up power.
Blinking green	RPS is connected but is unavailable. It is providing power to another device (redundancy has been allocated to the other device).
Amber	The RPS is in standby mode or in a fault condition. See the RPS documentation.
Blinking amber	The power supply in a switch has failed, and the RPS is providing power to the switch (redundancy has been allocated to this device).

## Master LED

This table describes the master LEDs.

**Table 4: Master LED**

Port Mode	Description
Off	Switch is not the stack master.
Green	Switch is the stack master or a standalone switch.

## Port LEDs and Modes

Port Mode	Description
Amber	An error occurred when the stack was electing the stack master switch, or another type of stack error occurred.

## Port LEDs and Modes

The port and module slots each has a port LED. As a group or individually, the LEDs show information about the switch and about the ports.

**Table 5: Port Mode LEDs**

Mode LED	Port Mode	Description
STAT	Port status	The port status. This is the default mode.
SPEED	Port speed	The port operating speed: 10, 100, 1000 Mb/s, or 10 Gb/s.
STACK	Stack member status	The stack member status.
	Stack port status	The stack port status.
PoE	PoE port power	The PoE status.

To select or change a mode, press the Mode button until the desired mode is highlighted. When you change port modes, the meanings of the port LED colors also change.

**Table 6: Meanings of LED Colors in Different Modes**

<b>Port Mode</b>	<b>Port LED Color</b>	<b>Meaning</b>
PoE	Off	PoE is off. If the powered device is receiving power from an AC power source, the port LED is off even if the powered device is connected to the switch port.
	Green	PoE is on. The port LED is green only when the switch port is providing power.
	Alternating green and amber	PoE is denied because providing power to the powered device will exceed the switch power capacity.
	Blinking amber	PoE is off due to a fault. Noncompliant cabling or powered devices can cause a PoE port fault. Use only standard-compliant cabling to connect Cisco prestandard IP Phones and wireless access points or IEEE 802.3af-compliant devices. You must remove any cable or device that causes a PoE fault.
	Amber	PoE for the port is disabled. (PoE is enabled by default.)

## Port LEDs and Modes

Port Mode	Port LED Color	Meaning
STAT (port status)	Off	No link or port was administratively shut down.
	Green	Link present.
	Blinking green	Activity. Interface is sending or receiving data.
	Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, cyclic redundancy check (CRC) errors, and alignment and jabber errors are monitored for a link-fault indication.
	Amber	Port is blocked by Spanning Tree Protocol (STP) and is not forwarding data.  After a port is reconfigured, the port LED can remain amber for up to 30 seconds as STP searches the switch for possible loops.
	Blinking amber	Port is blocked by STP and is sending and receiving packets.
SPEED	10/100/1000 ports	
	Off	Port is operating at 10 Mb/s.
	Green	Port is operating at 100 Mb/s.
	Blinking green	Port is operating at 1000 Mb/s.
	SFP module ports	
	Off	Port is operating at 10 Mb/s.
	Green	Port is operating at 100 Mb/s.
	Blinking green	Port is operating at 1000 Mb/s.
	SFP+ module ports (Applies to the Catalyst 2960X-48FPD-L, 2960X-48LPD-L, 2960X-24PD-L, 2960X-48TD-L, and the 2960X-24TD-L switches.)	
	Off	Port is not operating.
	Blinking green	Port is operating at 10 Gb/s.
	Green	Port is operating at 1 Gb/s.

Port Mode	Port LED Color	Meaning
STACK (stack member)	Off	No stack member has that member number.
	Blinking green	Stack member number.
	Green	Member numbers of other stack member switches.

If your switches are stacked and you press the Mode button on any switch, all the switches display the same selected mode. For example, if you press the Mode button on the stack master to display SPEED, all the other stack members display SPEED.

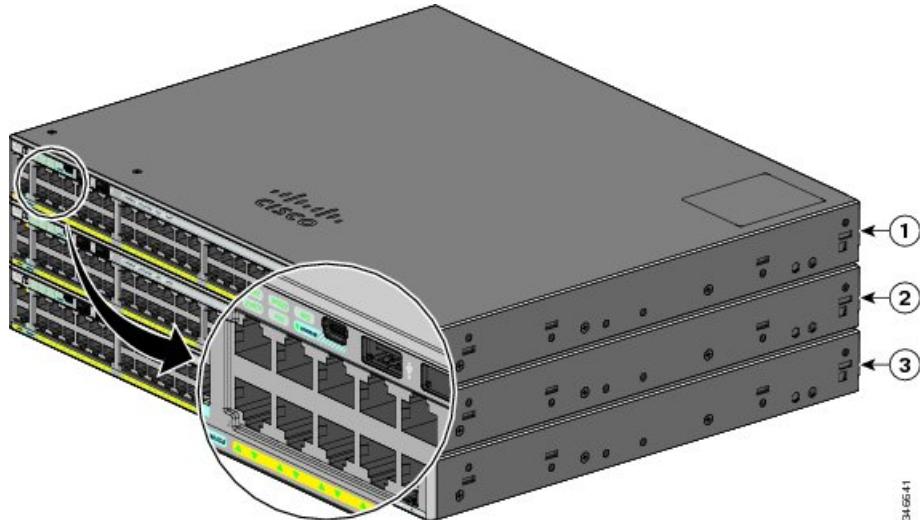
Even if PoE mode is not selected, this LED still shows PoE problems if they are detected.

## STACK LED

The STACK LED shows the sequence of member switches in a stack. Up to eight switches can be members of a stack. The first eight port LEDs show the switch member number. For example, if you press the Mode button and select Stack, the port LED 1 blinks green. The LEDs for port 2 and 3 are solid green, as these represent the member numbers of other stack members. The other port LEDs are off because there are no more members in the stack.

**Figure 4: STACK LED**

This figure shows the LEDs on the first switch, which is stack member number 1.



1	Stack member 1	3	Stack member 3
2	Stack member 2		

When you select the STACK LED, the respective STACK LEDs are green when the stack ports (on the switch rear panel) are up, and the respective Stack LEDs are amber when the ports are down. SFP+ module port LEDs 1 and 2 on the switch show the status for stack ports 1 and 2, respectively.

## Console LEDs

If the port LEDs are green on all the switches in the stack, the stack is operating at full bandwidth. If any port LED is not green, the stack is not operating at full bandwidth.

## Console LEDs

The console LEDs show which console port is in use. If you connect a cable to a console port, the switch automatically uses that port for console communication. If you connect two console cables, the USB console port has priority.

**Table 7: RJ-45 and USB Console LEDs**

LED	Color	Description
RJ-45 console port	Green	RJ-45 console port is active. When this LED is on, the USB console port LED is off.
	Off	The port is not active, and the USB console port is active.
USB console port	Green	USB console port is active. When this LED is on, the RJ-45 console port LED is off.
	Off	The port is not active, and the RJ-45 console port is active.

## Ethernet Management Port LED

**Table 8: Ethernet Management Port LED**

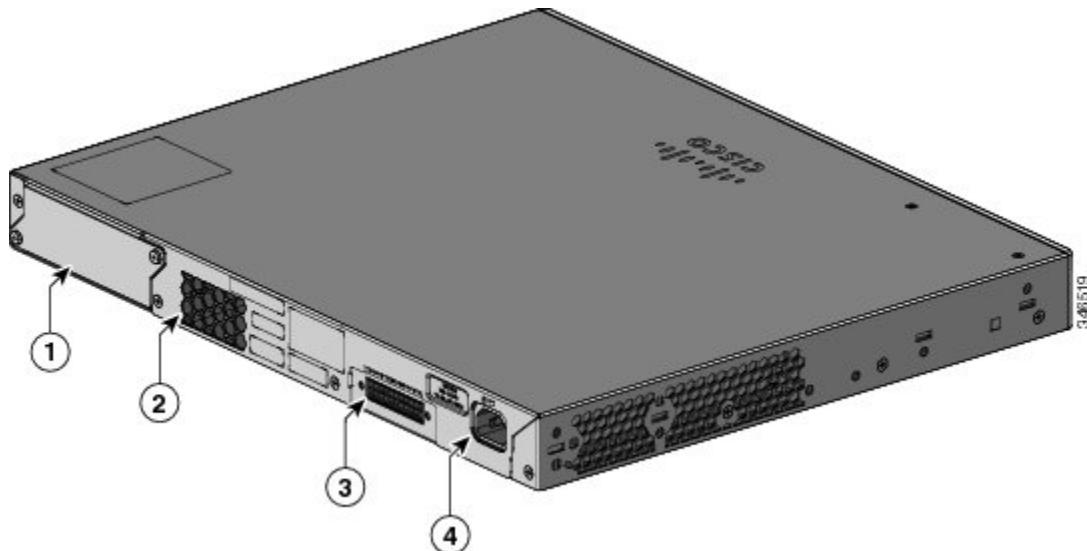
Color	Description
Green	Active link to PC.
Off	Inactive link.
Amber	POST failure.

## Rear Panel

The rear panel of the Catalyst 2960-X switches have a FlexStack module slot, a fan exhaust, an RPS connector, and an AC power connector.



**Note** The FlexStack module slot is not available on the Catalyst 2960X-48TS-LL and 2960X-24TS-LL switches.

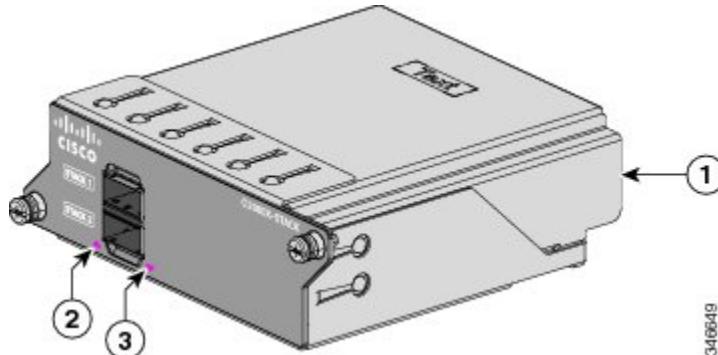
*Figure 5: Catalyst 2960-X Switch Rear Panel*

1	FlexStack module slot and cover	3	RPS Connector
2	Fan Exhaust	4	AC power connector

## FlexStack Ports and LEDs

### FlexStack-Plus Ports and LEDs

The stacking-capable switch models support stacking with the optional stack kit. It has the FlexStack-Plus module (hot-swappable) that inserts in the slot located in the switch rear panel, and a 0.5-meter FlexStack cable to connect the FlexStack-Plus module ports.

*Figure 6: FlexStack-Plus Module*

1	FlexStack-Plus module	3	LED for Stack port 2
2	LED for Stack port 1		

## FlexStack-Extended Ports and LEDs

This table lists the FlexStack-Plus module LED colors and their meanings.

**Table 9: FlexStack-Plus Module LEDs**

Color	Description
Green	Port is active, cable is attached.
Off	The port is not active, no cable is attached.

**Table 10: Stack Configurations**

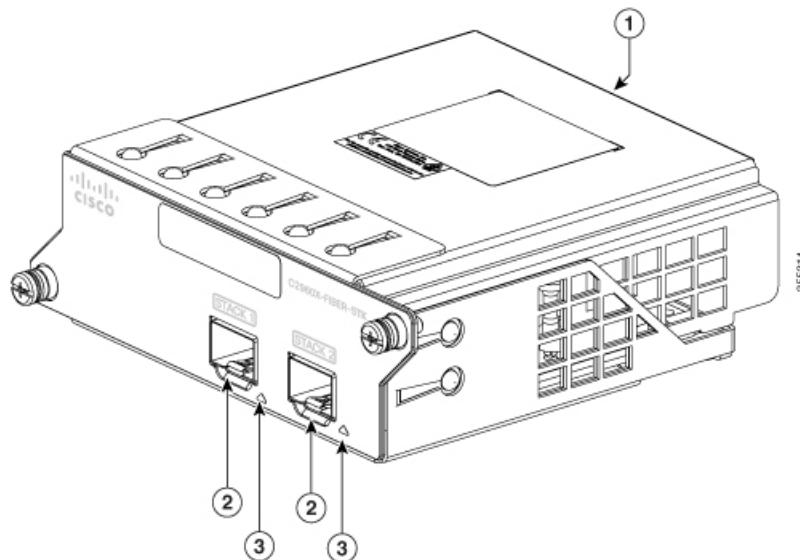
Switch	Number of Switches in the Stack	Bandwidth
Stack with Catalyst 2960-X stack-capable switches	8	80 G
	8	80 G
Mixed stack with Catalyst 2960-S and Catalyst 2960-X stack-capable switches	4	40 G

## FlexStack-Extended Ports and LEDs

### FlexStack-Extended Fiber Module

The FlexStack-Extended Fiber Module (C2960X-FIBER-STK) is used to stack switches across wiring closets on different floors of a building or across different buildings in a campus. The module allows stacking over SFP+ module ports and provides bandwidth of up to 40 Gpbs over longer distance. The FlexStack-Extended Fiber module has two SFP+ module ports. The SFP+ port enables long-reach stacking using standard multimode LR (300m) and EX (7km) optics. You should select the appropriate SFP+ module depending on the distance required between the switches.

For more information about the SFP+ transceiver modules supported on FlexStack ports, see [Compatibility Matrix](#).

**Figure 7: FlexStack-Extended Fiber Module**

1	FlexStack-Extended Fiber module	3	LEDs for SFP+ module ports
2	SFP+ module ports		

### FlexStack-Extended Hybrid Module

The Cisco FlexStack-Extended Hybrid module (C2960X-HYBRID-STK) has one SFP+ port and one copper FlexStack-Plus port. The copper port enables short-reach connectivity across a local stack of switches. The SFP+ port enables long-reach stacking using standard multimode LR (300m) and EX (7km) optics. You can choose the appropriate SFP+ depending on the distance between the switches.

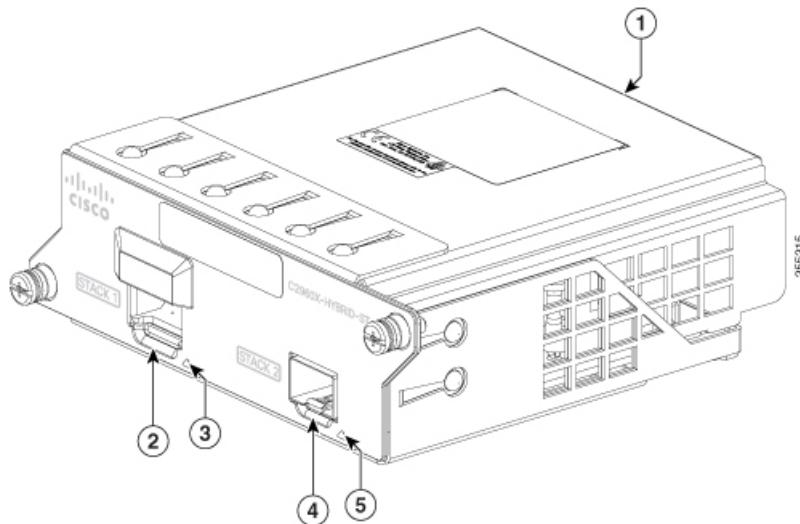
For more information about the SFP+ transceivers supported on the FlexStack ports, see [Compatibility Matrix](#).

The copper FlexStack-Plus port allows the switch to stack with the Cisco FlexStack-Plus stacks. You can only stack Cisco Catalyst 2960-X or Cisco Catalyst 2960-XR switches. FlexStack cables of following lengths are supported.

- CAB-STK-E-0.5M= (0.5-meter cable)
- CAB-STK-E-1M= (1-meter cable)
- CAB-STK-E-3M= (3-meter cable)

## FlexStack-Extended Ports and LEDs

**Figure 8: FlexStack-Extended Hybrid Module**



1	FlexStack-Extended Hybrid module	4	Fiber SFP+ module port
2	Copper FlexStack-Plus port	5	LED for Fiber SFP+ module port
3	LED for Copper FlexStack-Plus port		

This table lists the FlexStack-Extended module LED colors and their meanings.

**Table 11: FlexStack-Extended Module LEDs**

Color	Description
Green	Port link is up, but there is no packet activity.
	Port link is up and packet activity is present.
Off	Port link is down.

**Table 12: Stack Configurations**

Switch	Number of Switches in the Stack	Bandwidth
Stack with Catalyst 2960-X stack-capable switches	8	40 G
	8	40 G

## RPS Connector

The Cisco RPS 2300 (model PWR-RPS2300) supports the Catalyst 2960-X switch.

**Warning**

Attach only the following Cisco RPS model to the RPS receptacle: RPS2300. Statement 370

Connect the switch and the redundant power system to different AC power sources.

Use this cable for the RPS: CAB-RPS2300-E.

### Cisco RPS 2300

The Cisco RPS 2300 is a redundant power system that can support six external network devices and provide power to one or two failed devices at a time. It senses when the internal power supply of a connected device fails and provides power to the failed device, preventing loss of network traffic. For more information, see the *Cisco Redundant Power System 2300 Hardware Installation Guide* on Cisco.com at this URL: [http://www.cisco.com/en/US/products/ps7148/prod\\_installation\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps7148/prod_installation_guides_list.html)

The Cisco RPS 2300 has two output levels: -52 V and 12 V with a total maximum output power of 2300 W.

All supported and connected switches can simultaneously communicate with the RPS 2300. You can configure these RPS 2300 features through the switch software:

- Enable RPS active or standby mode for each connected switch
- Configure switch priority for RPS support
- List the connected switches and the power-supply module sizes
- Obtain reports when a switch is powered by the RPS
- Obtain status reports for the RPS power-supply module
- Read and monitor backup, failure, and exception history

## AC Power Connector

**Note**

This applies to the Catalyst 2960-X switches.

The switch is powered through the internal power supply. The internal power supply is an autoranging unit that supports input voltages between 100 and 240 VAC. Use the supplied AC power cord to plug it into an AC power outlet.

## Management Options

- Cisco Network Assistant

Cisco Network Assistant is a PC-based network management GUI application for LANs of small and medium-sized businesses. You can use the GUI to configure and manage switch clusters or standalone

switches. Cisco Network Assistant is available at no cost and can be downloaded from this URL: <http://www.cisco.com/en/US/products/ps5931/index.html>

For information on starting the Network Assistant application, see the *Getting Started with Cisco Network Assistant* guide on Cisco.com.

- Device Manager

You can use Device Manager in the switch memory to manage individual and standalone switches. This web interface provides configuration and monitoring from anywhere in your network. For information, see the switch getting started guide and the Device Manager online help.

- Cisco IOS CLI

You can configure and monitor the switch and switch cluster members from the CLI. Access the CLI by connecting your management station to the switch console port or by using Telnet from a remote management station. See the switch command reference on Cisco.com for information.

- Cisco Prime Infrastructure

Cisco Prime Infrastructure combines the wireless functionality of Cisco Prime Network Control System (NCS) and the wired functionality of Cisco Prime LAN Management Solution (LMS), with application performance monitoring and troubleshooting capabilities of Cisco Prime Assurance Manager. For more information, see the Cisco Prime Infrastructure documentation on Cisco.com.

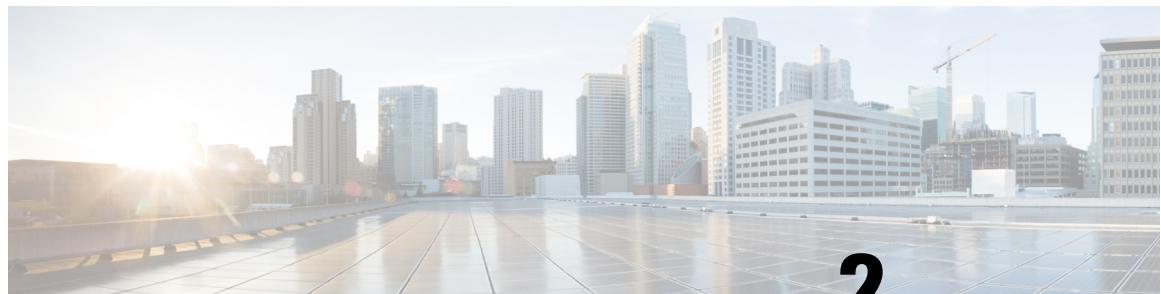
- Catalyst Smart Operations

The Smart Install feature provides a single point of management (director) in a network. You can use it to provide a zero touch image and configuration upgrade of newly deployed switches and image and configuration downloads for any client switches. For information, see the *Cisco Smart Install Configuration Guide* on Cisco.com.

Auto Smartports macros dynamically configure ports based on the device type detected on the port. When the switch detects a new device, it applies the appropriate Auto Smartports macro on the port. For information about configuring Auto Smartports, see the switch software configuration guide on Cisco.com.

## Network Configurations

See the switch software configuration guide for network configuration concepts and examples of using the switch to create dedicated network segments and interconnecting the segments through Fast Ethernet and Gigabit Ethernet connections.



## CHAPTER 2

# Switch Installation

For initial switch setup, assigning the switch IP address, and powering on information, see the switch getting started guide on Cisco.com.

This chapter contains these topics:

- Safety Warnings, on page 19
- Box Contents, on page 22
- Tools and Equipment, on page 22
- Installation Guidelines, on page 22
- Verifying Switch Operation, on page 23
- Planning and Installing a Switch Stack (Optional), on page 24
- Installing the Switch, on page 30
- Connecting FlexStack modules, on page 36
- Removing a FlexStack Cable, on page 39
- Installing the Power Cord Retainer (Optional), on page 39
- Installing SFP Modules, on page 41
- Connecting to SFP and SFP+ Modules, on page 42
- 10/100/1000 PoE and PoE+Port Connections, on page 45
- 10/100/1000/Multigigabit Ethernet Port Connections, on page 46
- Where to Go Next, on page 47

## Safety Warnings

This section includes the basic installation caution and warning statements. Read this section before you start the installation procedure. Translations of the warning statements appear in the RCSI guide on Cisco.com.



### Warning

Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43



### Warning

Do not stack the chassis on any other equipment. If the chassis falls, it can cause severe bodily injury and equipment damage. Statement 48

**Safety Warnings****Warning**

This product must be connected to a power-over-ethernet (PoE) IEEE 802.3af compliant power source or an IEC60950 compliant limited power source. Statement 353

**Warning**

Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system. Statement 378

**Warning**

Attach only the following Cisco external power system to the switch: PWR-RPS2300 Statement 387

**Warning**

Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001

**Warning**

Read the installation instructions before connecting the system to the power source. Statement 1004

**Warning**

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Statement 1006

**Warning**

Class 1 laser product. Statement 1008

**Warning**

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

**Warning**

The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

**Warning**

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

**Warning**

Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

**Warning**

Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

**Warning**

For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection: 10/100/1000 Ethernet. Statement 1044

**Warning**

When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

**Warning**

To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: <113°F (45°C). Statement 1047

**Warning**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

**Warning**

Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security. Statement 1072

**Warning**

No user-serviceable parts inside. Do not open. Statement 1073

**Warning**

Installation of the equipment must comply with local and national electrical codes. Statement 1074

**Warning**

To prevent airflow restriction, allow clearance around the ventilation openings to be at least: 3 inches (7.6 cm). Statement 1076

**Warning**

Hot surface. Statement 1079

## Box Contents

The switch getting started guide describes the box contents. If any item is missing or damaged, contact your Cisco representative or reseller for support.

## Tools and Equipment

Obtain these necessary tools:

- A Number-2 Phillips screwdriver.

## Installation Guidelines

When determining where to install the switch, verify that these guidelines are met:

- Clearance to the switch front and rear panel meets these conditions:
  - Front-panel LEDs can be easily read.
  - Access to ports is sufficient for unrestricted cabling.
  - AC power cord can reach from the AC power outlet to the connector on the switch rear panel.

- Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures. Make sure that the cabling is safely away from other devices that might damage the cables.
- For switches with the optional 1025-W power-supply module, first rack-mount the switch before installing the power-supply module.
- When connecting or disconnecting the power cord on a switch that is installed above or below a 1025-W power supply-equipped switch, you might need to remove the module from the switch to access the power cord.
- Airflow around the switch and through the vents is unrestricted.
- Temperature around the unit does not exceed 113°F (45°C). If the switch is installed in a closed or multirack assembly, the temperature around it might be greater than normal room temperature.
- Humidity around the switch does not exceed 95 percent.
- Altitude at the installation site is not greater than 10,000 feet.
- For 10/100/1000 fixed ports, the cable length from a switch to a connected device cannot exceed 328 feet (100 meters).
- Cooling mechanisms, such as fans and blowers in the switch, can draw dust and other particles causing contaminant buildup inside the chassis, which can result in system malfunction. You must install this equipment in an environment as free from dust and foreign conductive material (such as metal flakes from construction activities) as is possible.

## Verifying Switch Operation

Before you install the switch in a rack, on a wall, or on a table or shelf, power on the switch and verify that it passes POST.

To power on the switch, plug one end of the AC power cord into the switch AC power connector, and plug the other end into an AC power outlet.

As the switch powers on, it begins the POST, a series of tests that runs automatically to ensure that the switch functions properly. LEDs can blink during the test. The SYST LED blinks green, and the other LEDs remain solid green.

When the switch completes POST successfully, the SYST LED remains green. The other LEDs turn off and then reflect the switch operating status. If a switch fails POST, the SYST LED turns amber.

POST failures are usually fatal. Call Cisco technical support representative if your switch fails POST.

After a successful POST, unplug the power cord from the switch and install the switch in a rack, on a wall, on a table, or on a shelf.



### Warning

Attach only the following Cisco external power system to the switch: Cisco XPS 2200 Statement 387

# Planning and Installing a Switch Stack (Optional)



**Note** This section applies only to the Catalyst 2960-X stacking-capable switches.

## Stack Guidelines

- Connect only Catalyst 2960-X or 2960-S switches in a mixed switch stack.



**Note** You can only create mixed stacks with Catalyst 2960-X or 2960-S switches (up to four switches). You cannot create mixed stacks with other switches.

- Perform one of the following:
  - Install the FlexStack-Plus module and the FlexStack cable.
  - Install the FlexStack-Extended Fiber module and the fiber-optic cable.
  - Install the FlexStack-Extended Hybrid module and the required fiber-optic/FlexStack cables.



**Note** All the FlexStack modules are hot-swappable and can be inserted while the switch is powered on.

- Order the appropriate cable from your Cisco sales representative. The length of FlexStack cable depends on your configuration. These are the different sizes available:
  - CAB-STK-E-0.5M= (0.5-meter cable)
  - CAB-STK-E-1M= (1-meter cable)
  - CAB-STK-E-3M= (3-meter cable)
- Make sure that you have access to the switch rear panel and to the rear of the rack.

## Installing a FlexStack-Plus or a FlexStack-Extended Module

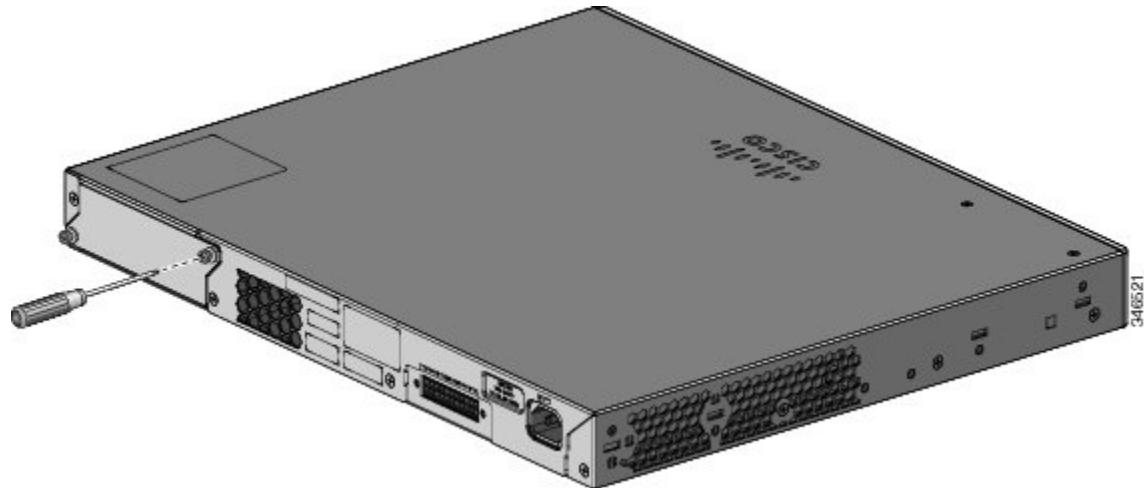


**Note** The switch should always have a blank module installed when a FlexStack module is not used.

The Catalyst 2960X-48P-L switch is shown as an example. You can install the module in other switches as shown.

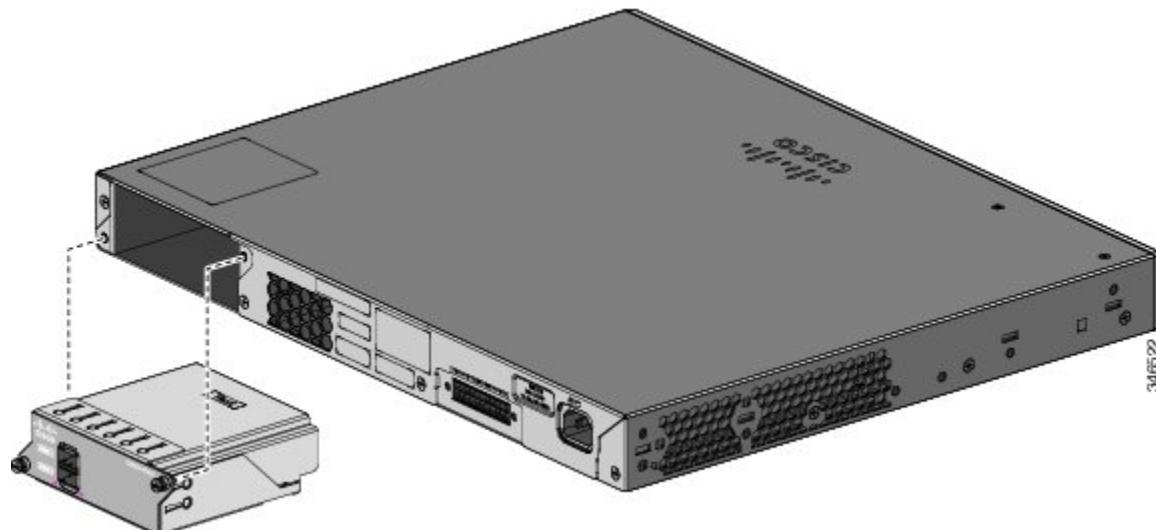
## Procedure

- Step 1** Use a number 2 Phillips-head screwdriver to remove the FlexStack module blank cover on the switch back panel.

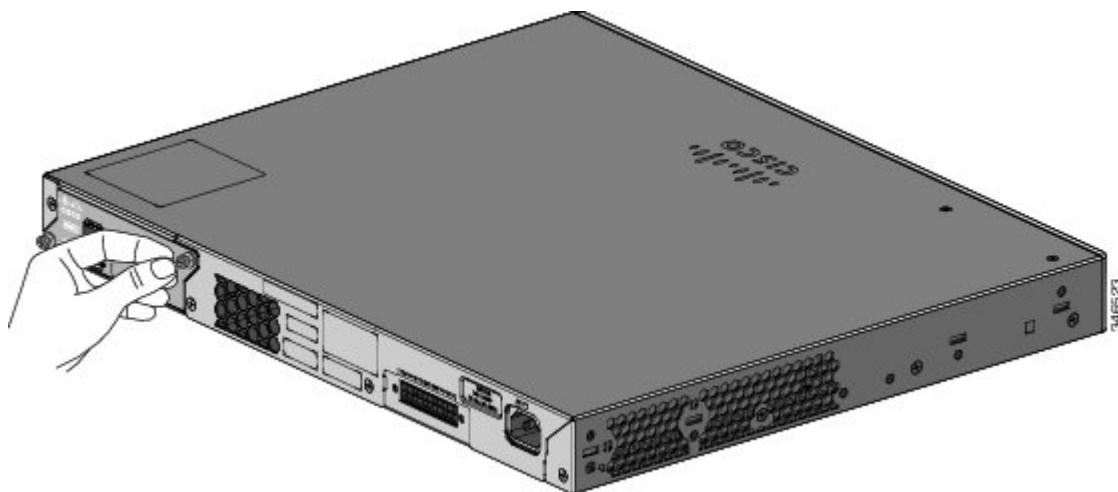


- Step 2** Grasp the FlexStack module on the sides, and insert it into the module slot. Push the module in completely until you feel it snap into place.

The following example image uses FlexStack-Plus module.



- Step 3** Secure the screws on each side of the module.

**Stack Cabling**

**Note** Avoid overtightening the screws.

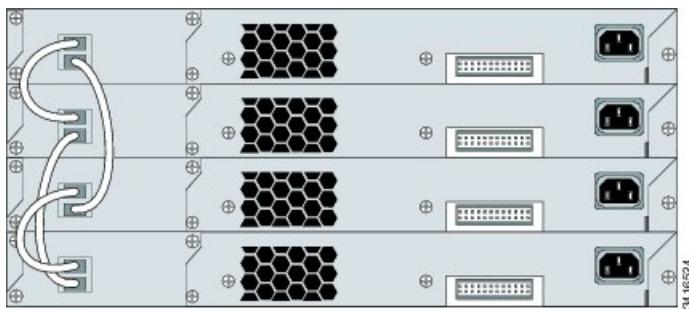
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## Stack Cabling

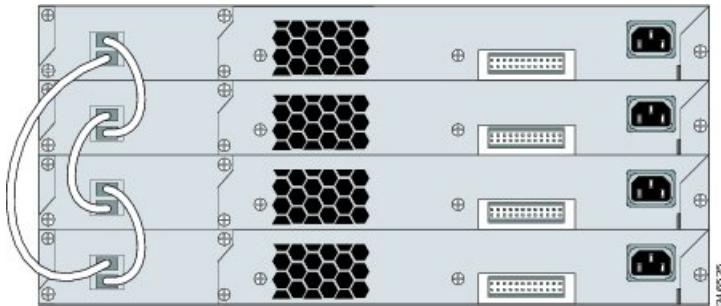
### Stacking using FlexStack-Plus Modules

*Figure 9: Stacking Switches with the 0.5-meter FlexStack Cable*

These figures show the switches stacked in a vertical rack or on a table. The connections are redundant.



*Figure 10: Stacking Switches with 0.5-meter and 3-meter FlexStack Cables*

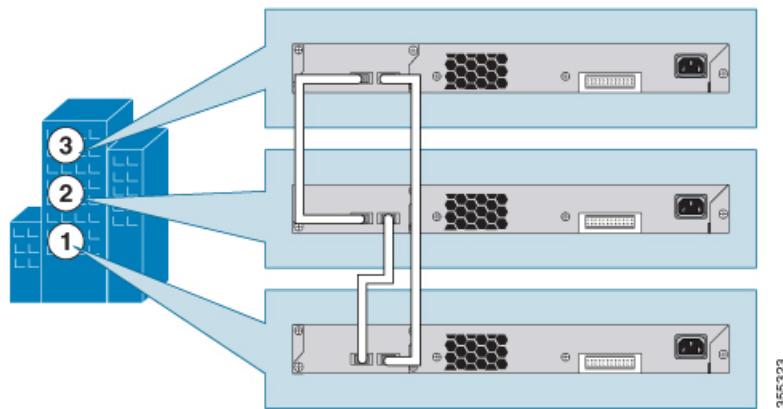


## Stacking using FlexStack-Extended Modules

This section explains the supported stacking topologies using FlexStack-Extended Modules.

The following topology is created by stacking switches with FlexStack-Extended Fiber modules that are deployed across different floors of a building. The SFP+ module ports are connected using fiber cables.

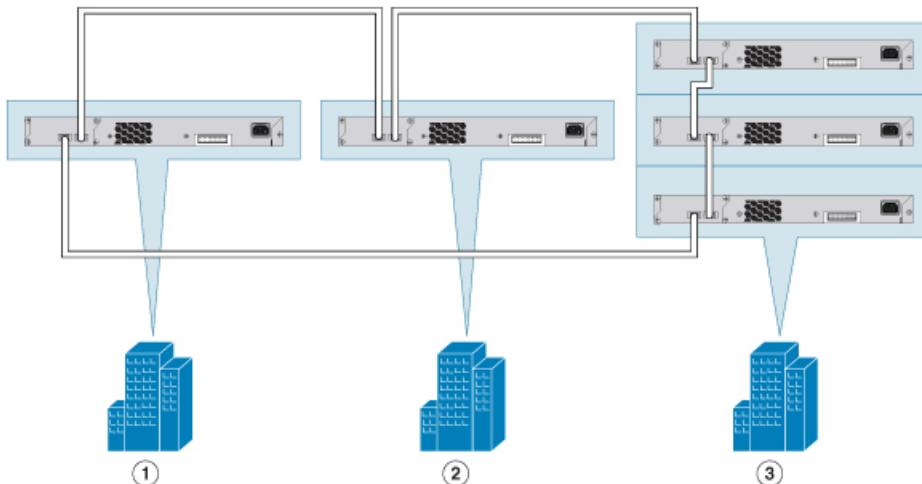
**Figure 11: Stacking with FlexStack-Extended Fiber Modules Across Floors of a Building**



355323

The following topology is created by stacking switches with FlexStack-Extended Fiber modules that are deployed across multiple buildings of a campus and different floors of a building.

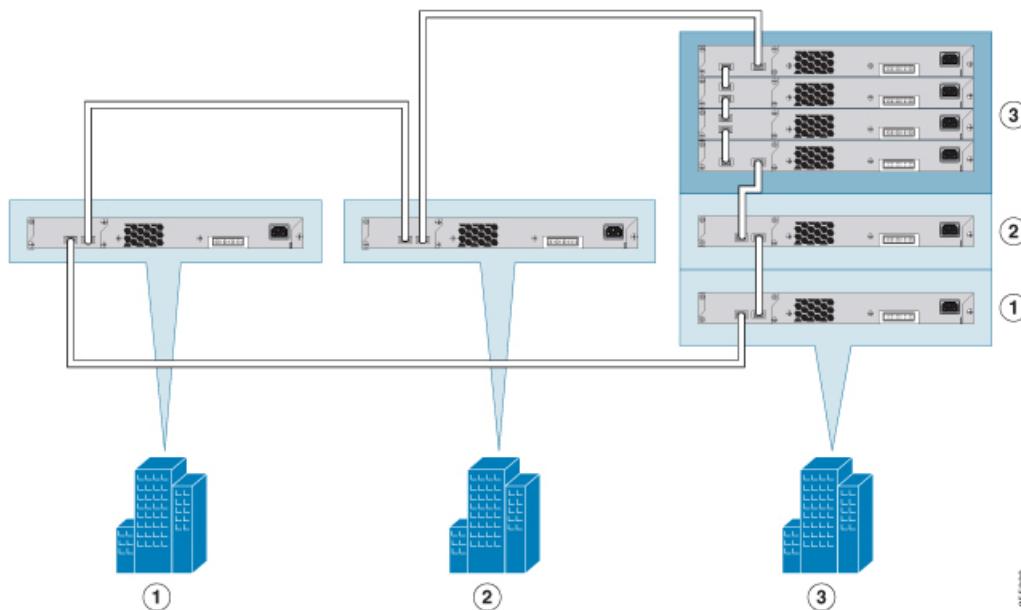
**Figure 12: Stacking with FlexStack-Extended Fiber Modules Across Floors and Buildings**



355324

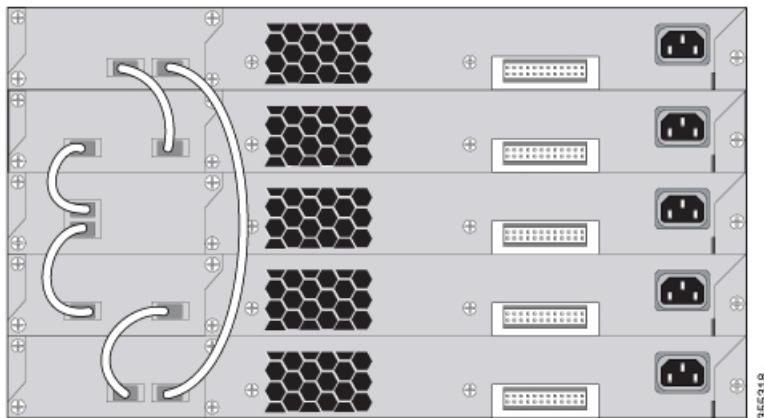
Using FlexStack-Extended Hybrid module, you can combine existing stack of switches and new switches spread across multiple wiring closets into one single stack. To achieve this, the copper port on the FlexStack-Extended Hybrid module should be connected to the FlexStack-Plus port on a switch in your existing network. The fiber port on the Cisco FlexStack-Extended Fiber module can be used to connect switches over long distances. You can stack up to eight switches.

## Stack Cabling

**Figure 13: Extending Traditional FlexStack-Plus Stacks using FlexStack-Extended Modules**

355390

The following image shows a mixed stack network using FlexStack-Plus, FlexStack-Extended Fiber and Hybrid modules. This is one of the supported topologies using FlexStack modules. Typically, fiber modules are used to extend a network for long distance communication across buildings or floors in a building.

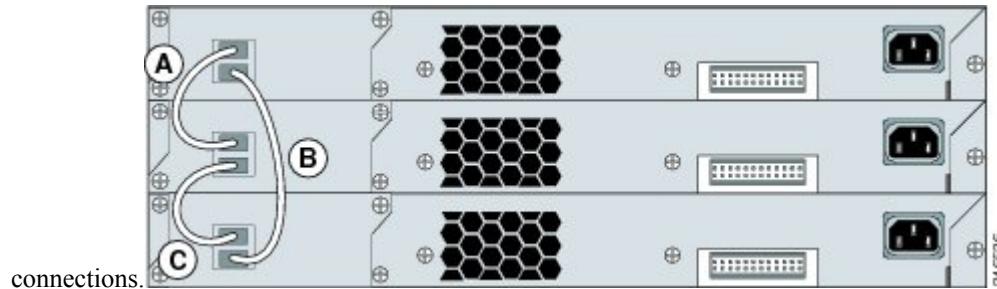
**Figure 14: Mixed Stacking with FlexStack Modules**

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## Stack Bandwidth and Partitioning Examples

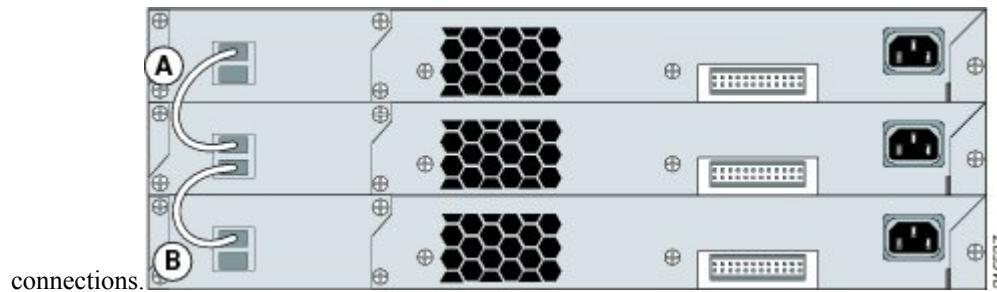
**Figure 15: Stack with Full Bandwidth Connections**

This figure shows a stack that provides full bandwidth with redundant



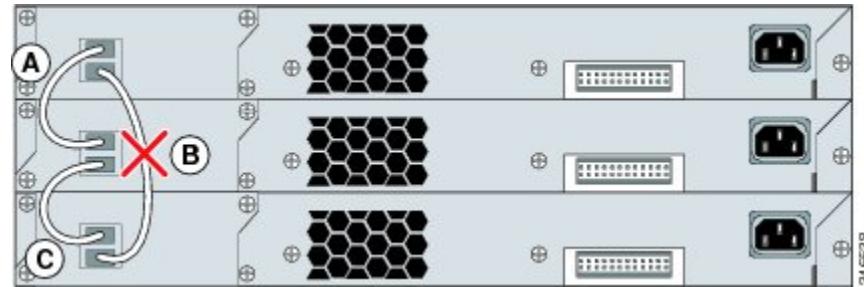
**Figure 16: Stack with Half Bandwidth Connections**

This figure shows a stack with incomplete stack cabling connections. This stack provides only half bandwidth and does not have redundant



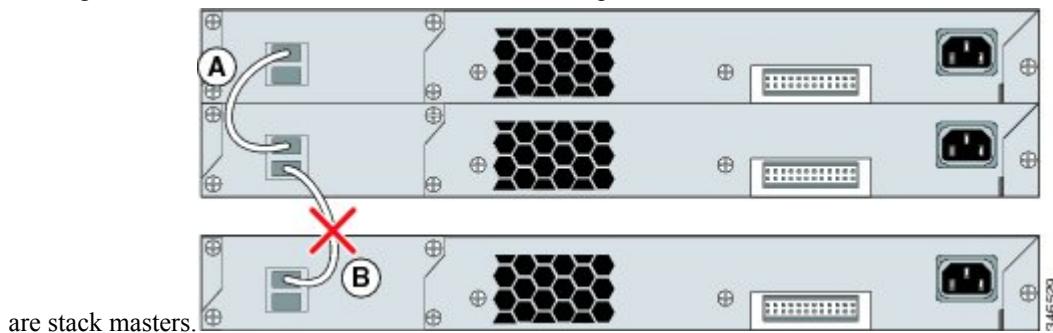
**Figure 17: Stack with a Failover Condition**

This figure shows a stack with a bad FlexStack cable in link B. This stack provides only half bandwidth and does not have redundant connections.



**Figure 18: Partitioned Stack with a Failover Condition**

This figure shows a stack with a bad link B. This stack partitions into two stacks, and switch 1 and switch 3



are stack masters.

## Power-On Sequence for Switch Stacks

Consider these guidelines before you power on the switches in a stack:

- The sequence in which the switches are first powered on might affect the switch that becomes the stack master.
- If you want a particular switch to be the stack master, power on that switch first. This switch becomes the stack master and remains the stack master until a master reelection. After 2 minutes, power on the other stack switches.
- If you have no preference as to which switch becomes the stack master, power on all the switches in the stack within a 1-minute timeframe. These switches participate in the stack master election. Switches powered on after the 1-minute timeframe do not participate in the election.
- Power off a switch before you add it to or remove it from an existing switch stack.

For conditions that can cause a stack master reelection or to manually elect the stack master, see the *Catalyst 2960-X Switch Stacking Configuration Guide* on Cisco.com.

## Installing the Switch

### Rack-Mounting

Installation in other than 19-inch racks requires a bracket kit not included with the switch.

**Warning**

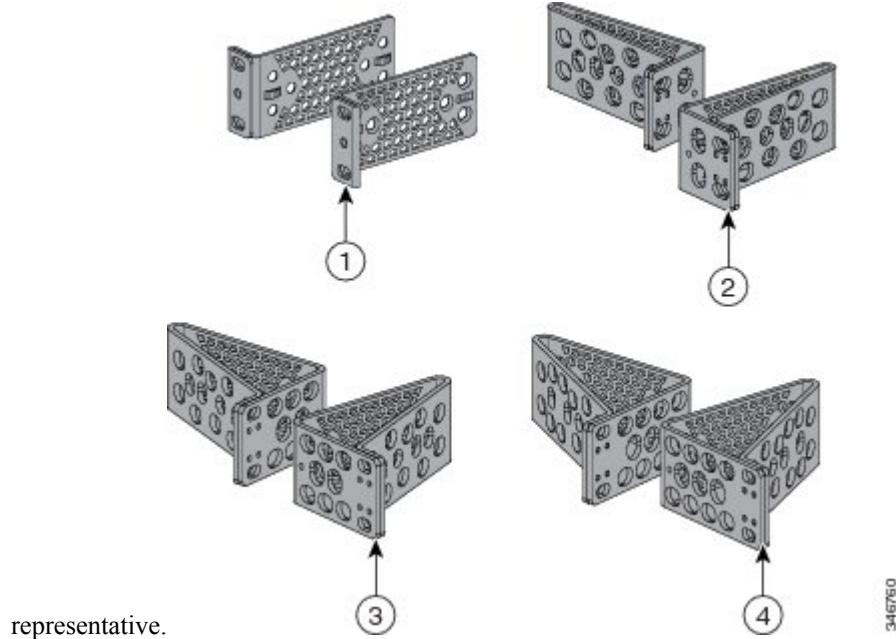
To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Statement 1006

**Figure 19: Rack-Mounting Brackets**

This figure shows the standard 19-inch brackets and other optional mounting brackets. You can order the optional brackets from your Cisco sales



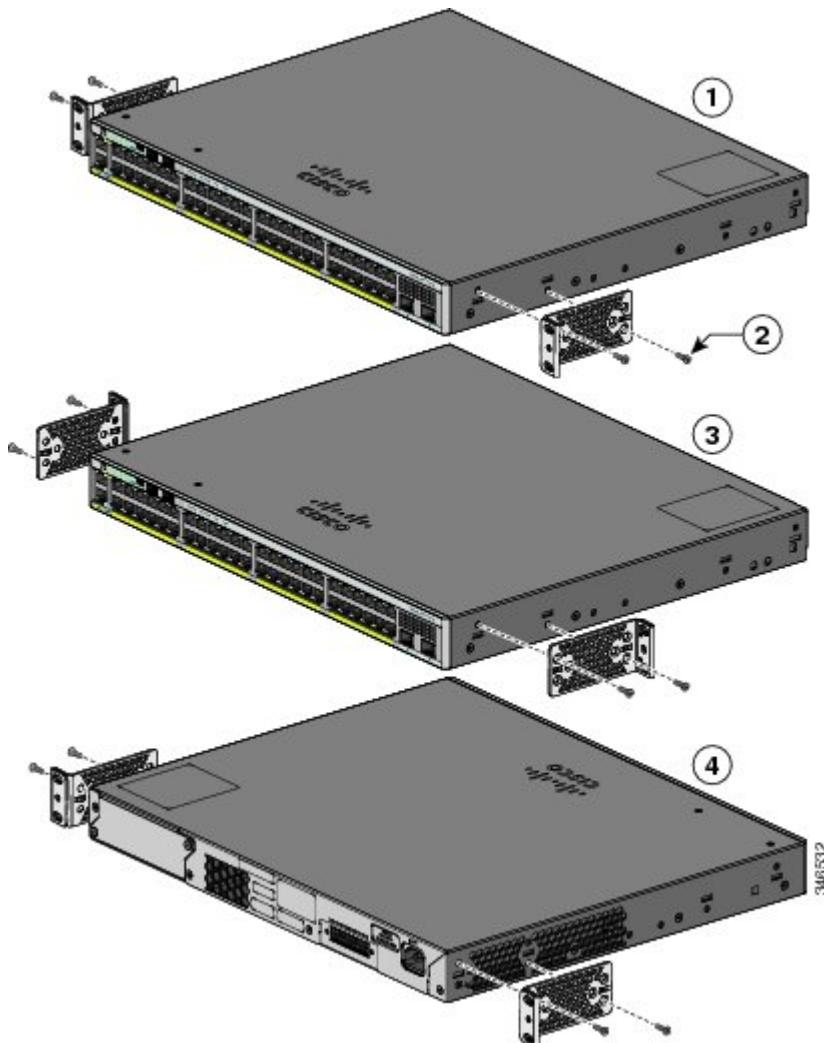
representative.

1	19-inch brackets	3	23-inch brackets
2	ETSI brackets	4	24-inch brackets

## Attaching the Rack-Mount Brackets for the Catalyst 2960-X Switches

### Procedure

Use two Phillips flat-head screws to attach the long side of the bracket to each side of the switch.

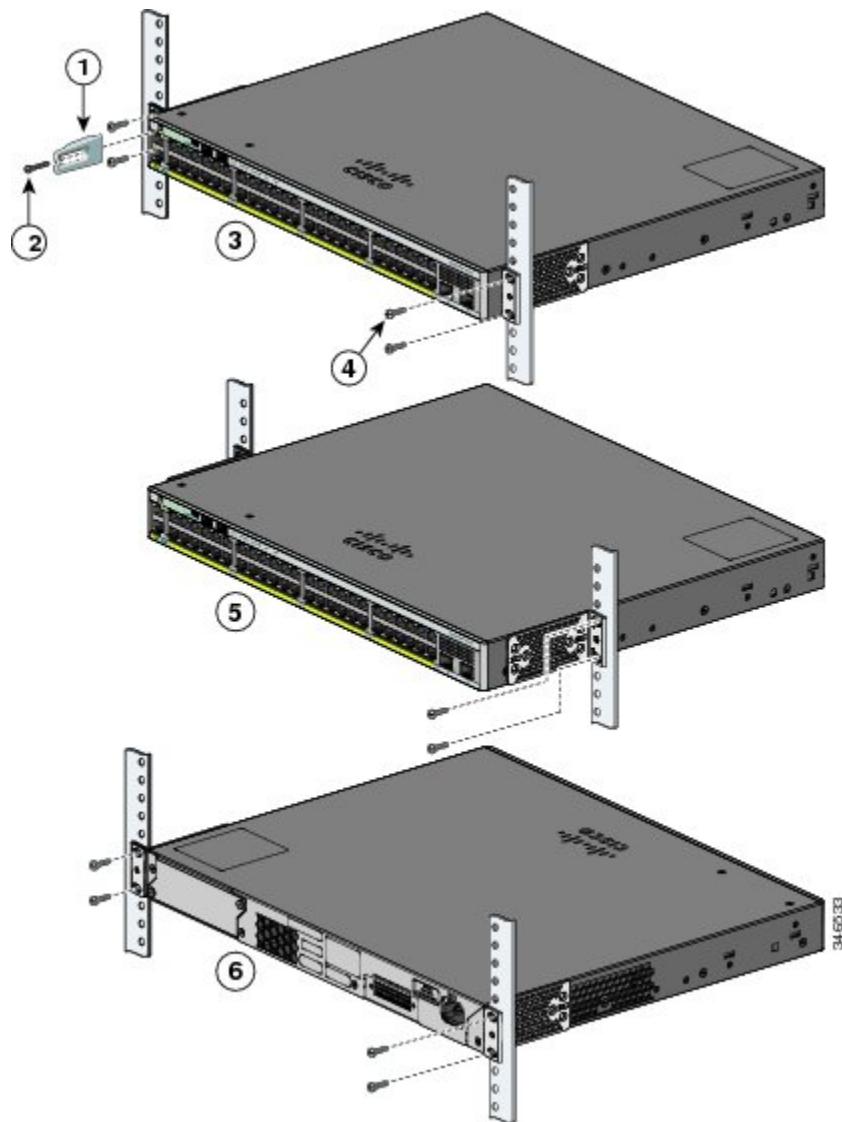
**Mounting in a Rack****Figure 20: Attaching Brackets for 19-inch Racks**

1	Front-mounting position	3	Mid-mounting position
2	Number-8 Phillips flat-head screws (48-2927-01)	4	Rear-mounting position

**Mounting in a Rack****Procedure**

**Step 1** Use the four supplied Phillips machine screws to attach the brackets to the rack.

**Step 2** Use the black Phillips machine screw to attach the cable guide to the left or right bracket.



1	Cable guide	4	Number-12 Phillips pan-head screws (48-0523-01) or Number-10 Phillips pan-head screws (48-0627-01)
2	Phillips machine screw, black (48-0654-01)	5	Mid-mounting position
3	Front-mounting position	6	Rear-mounting position

## Wall-Mounting


**Warning**

Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system. Statement 378

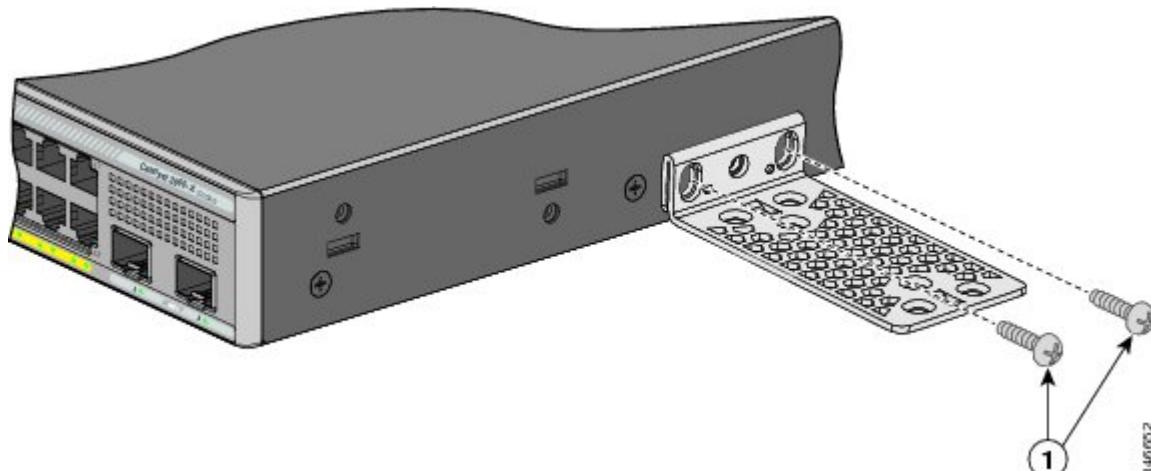
### Attaching the Brackets for Wall-Mounting

**Procedure**

**Step 1** Attach a 19-inch bracket to one side of the switch.

**Step 2** Follow the same steps to attach the second bracket to the opposite side.

*Figure 21: Attaching the 19-inch Brackets for Wall-Mounting*



1	Number-8 phillips flat-head screws (48-2927-01)
---	---

### Mounting on a Wall

For the best support of the switch and cables, make sure that the switch is attached securely to wall studs or to a firmly attached plywood-mounting backboard. Mount the switch with the front panel facing down.

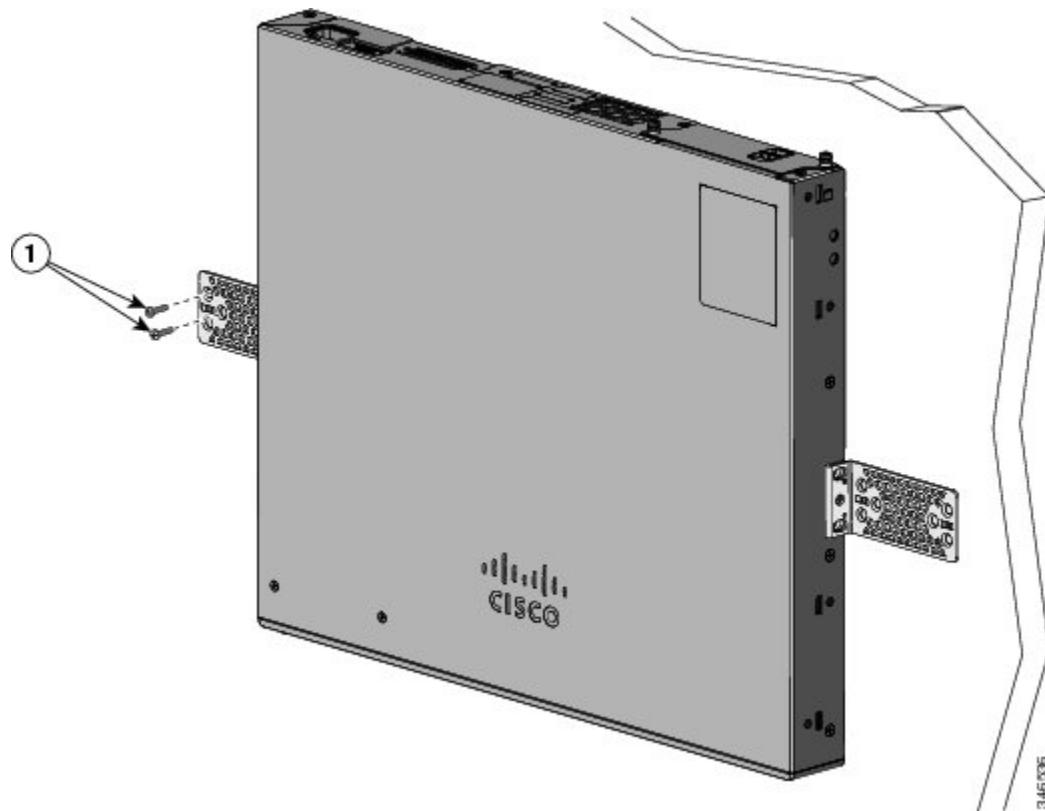

**Warning**

Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system. Statement 378

**Caution**

Following safety regulations, wall-mount the switch with its front panel facing down.

*Figure 22: Mounting on a Wall*



1	User-supplied screws (for example, you can use # 6 wood screws with a washer head 1-inch long).
---	---

When you complete the switch installation, see [After Switch Installation, on page 36](#) for information on switch configuration.

## Installing the Switch on a Table or Shelf

### Procedure

- 
- Step 1** To install the switch on a table or shelf, locate the adhesive strip with the rubber feet in the mounting-kit envelope.
  - Step 2** Attach the four rubber feet to the four circular etches on the bottom of the chassis.
  - Step 3** Place the switch on the table or shelf near an AC power source.

- Step 4** When you complete the switch installation, see [After Switch Installation, on page 36](#) for information on switch configuration.

## After Switch Installation

- Install the power cord retainer (optional).
- Connect to the front-panel ports.

### Related Topics

- [Connecting FlexStack-Plus modules \(Optional\), on page 36](#)  
[Installing the Power Cord Retainer \(Optional\), on page 39](#)  
[Installing an SFP or SFP+ Module, on page 41](#)  
[10/100/1000 PoE and PoE+Port Connections, on page 45](#)

## Connecting FlexStack modules

### Connecting FlexStack-Plus modules (Optional)

Always use a Cisco-approved FlexStack cable to connect the switches.



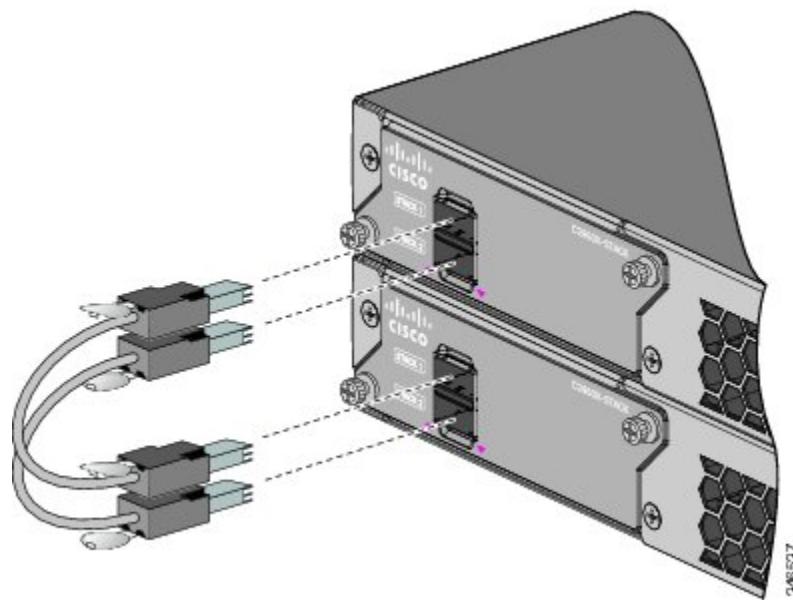
**Note** This is only supported on the stack-capable switches.



**Caution** Use only approved cables, and connect only to other Catalyst 2960-X or 2960-S switches. Equipment might be damaged if connected to other nonapproved Cisco cables or equipment.

### Procedure

- Step 1** Remove the dust covers from the FlexStack cables, and store them for future use.  
**Step 2** Insert one end of the FlexStack cable into the stack port of the first switch. Insert the other end of the cable into the stack port on the other switch. Make sure that you insert the cables in completely until you feel them snap into place.



**Note** When you connect the FlexStack cable to the STACK 1 port, the tab should be above the connector. When you connect the FlexStack cable to the STACK 2 port, the tab should be below the connector.

**Step 3** Replace the dust covers when you remove the FlexStack cables from the connectors.

**Caution** Removing and installing the FlexStack cable can shorten its useful life. Do not remove and insert the cable more often than is absolutely necessary.

---

## Connecting FlexStack-Extended modules (Optional)

Always use a Cisco-approved FlexStack cable to connect the switches.



**Note** This is only supported on the stack-capable switches.

---

### Procedure

---

**Step 1** Remove the dust covers from the FlexStack cables, and store them for future use.

**Step 2** Do one of the following:

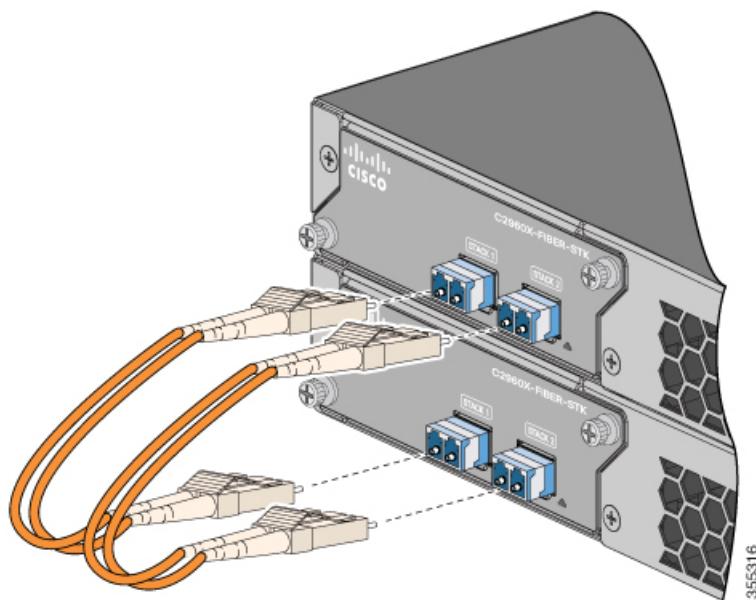
- To connect two FlexStack-Extended Fiber modules, insert one end of the FlexStack cable into the SFP+ module port of the first switch and the other end of the cable into the SFP+ module port on the other switch.
- To connect two FlexStack-Extended Hybrid modules, insert the FlexStack-Plus cable connectors into the copper FlexStack-Plus ports and the fiber module connectors into the SFP+ module ports on the switches.

**Connecting FlexStack-Extended modules (Optional)**

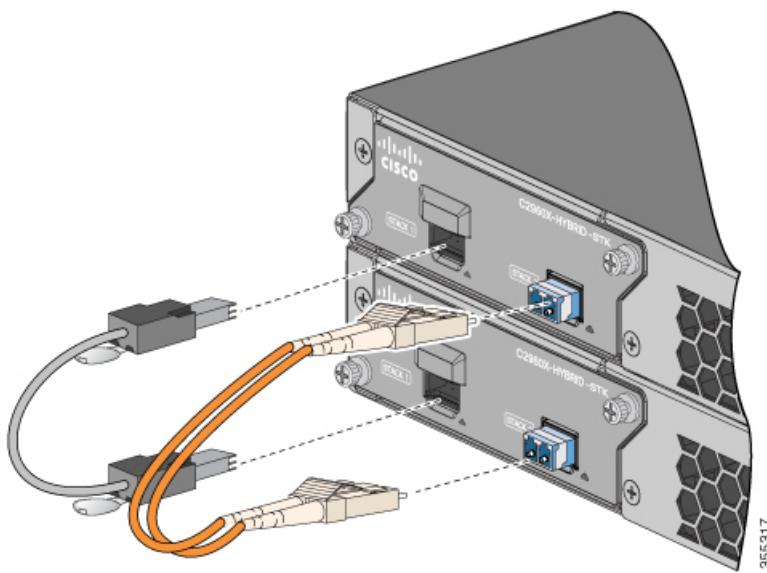
For information on installing an SFP+ module, see [Installing an SFP or SFP+ Module, on page 41](#).

Make sure that you insert the cables in completely until you feel them snap into place.

**Figure 23: Connecting Two FlexStack-Extended Fiber Modules**



**Figure 24: Connecting Two FlexStack-Extended Hybrid Modules**



**Note** When you connect the FlexStack cable to the STACK 1 ports on switches, ensure that the tabs are below the connectors.

**Step 3** Replace the dust covers when you remove the FlexStack cables from the connectors.

**Caution** Removing and installing the FlexStack cable can shorten its useful life. Do not remove and insert the cable more often than is absolutely necessary.

## Removing a FlexStack Cable

### Procedure

**Step 1** To remove a FlexStack cable, grasp the tab on the cable connector and gently pull straight out.

**Step 2** When you remove the FlexStack cables from the connectors, replace the dust covers to protect them from dust.

**Caution** Removing and installing the FlexStack cable can shorten its useful life. Do not remove and insert the cable more often than is absolutely necessary.

## Installing the Power Cord Retainer (Optional)

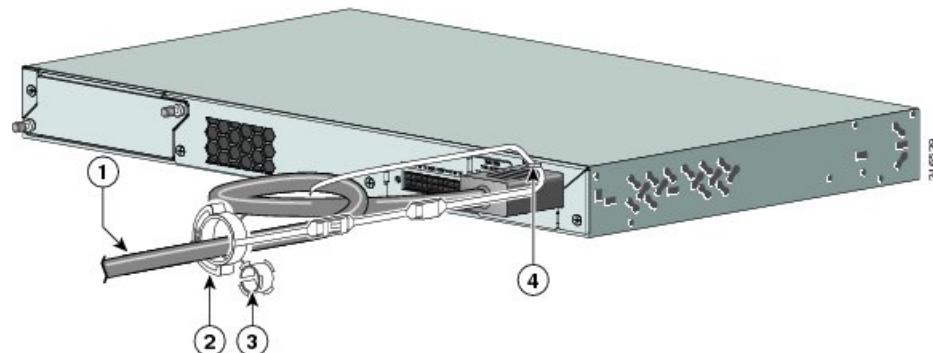
The power cord retainer is optional (part number [PWR-CLP=]). You can order it when you order your switch, or you can order it later from your Cisco representative.

### Procedure

**Step 1** Choose the sleeve size of the power cord retainer based on the thickness of the cord. The smaller sleeve can be snapped off and used for thin cords.

**Step 2** Slide the retainer around the AC power cord, and pass it around the loop on the switch.

*Figure 25: Inserting the Retainer Through the Lanced Loop*



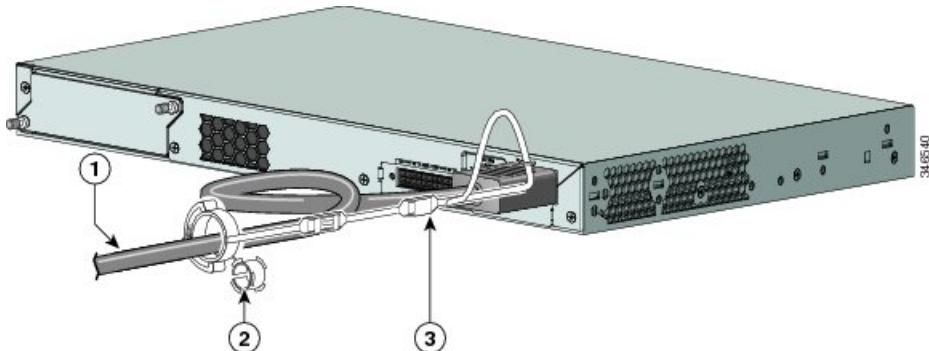
1	AC power cord	3	Sleeve for thinner power cords
---	---------------	---	--------------------------------

### Installing the Power Cord Retainer (Optional)

2	Power cord retainer	4	Loop
---	---------------------	---	------

**Step 3** Slide the retainer through the first latch.

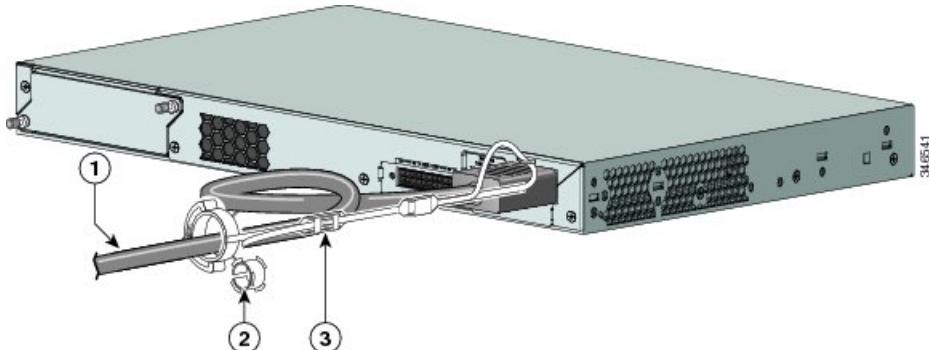
*Figure 26: Sliding the Retainer Through the Latch*



1	AC power cord	3	Latch
2	Smaller sleeve for thin power cords		

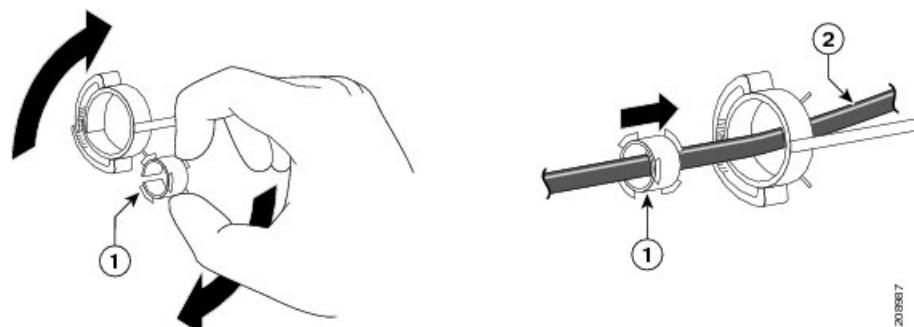
**Step 4** Slide the retainer through the other latches to lock it.

*Figure 27: Locking the Retainer*



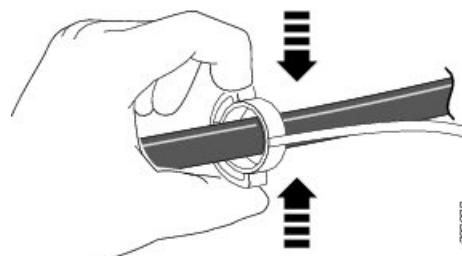
1	AC power cord	3	Latches
2	Sleeve for thin power cords		

**Step 5** (Optional) Use the small sleeve for thin power cords. Use the small sleeve to provide greater stability for thin cords. Detach the sleeve, and slide it over the power cord.

**Figure 28: Sleeve Around the Power Cord**

20398817

1	Sleeve for thin power cords	2	AC power cord
---	-----------------------------	---	---------------

**Step 6** Secure the AC power cord by pressing on the retainer.**Figure 29: Securing the Power Cord in the Retainer**

20398818

# Installing SFP Modules

**Related Topics**

[SFP and SFP+ Module Slots](#), on page 5

## Installing an SFP or SFP+ Module

**Before you begin**

When installing SFP or SFP+ modules, observe these guidelines:

- Do not remove the dust plugs from the modules or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the module ports and cables from contamination and ambient light.
- To prevent ESD damage, follow your normal board and component handling procedures when connecting cables to the switch and other devices.

**Caution**

Removing and installing an SFP or SFP+ module can shorten its useful life. Do not remove and insert any module more often than is absolutely necessary.

**Procedure**

**Step 1** Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface.

**Step 2** Find the send (TX) and receive (RX) markings on the module top.

On some SFP or SFP+ modules, the send and receive (TX and RX) markings might be replaced by arrows that show the direction of the connection.

**Step 3** If the module has a bale-clasp latch, move it to the open, unlocked position.

**Step 4** Align the module in front of the slot opening, and push until you feel the connector snap into place.

**Step 5** If the module has a bale-clasp latch, close it.

**Step 6** For fiber-optic SFP or SFP+ modules, remove the dust plugs and save.

**Step 7** Connect the SFP cables.

*Figure 30: Installing an SFP Module*



## Removing an SFP Module

## Connecting to SFP and SFP+ Modules

**Related Topics**

[SFP and SFP+ Module Slots](#), on page 5

# Connecting to Fiber-Optic SFP and SFP+ Modules



**Warning** Class 1 laser product. Statement 1008

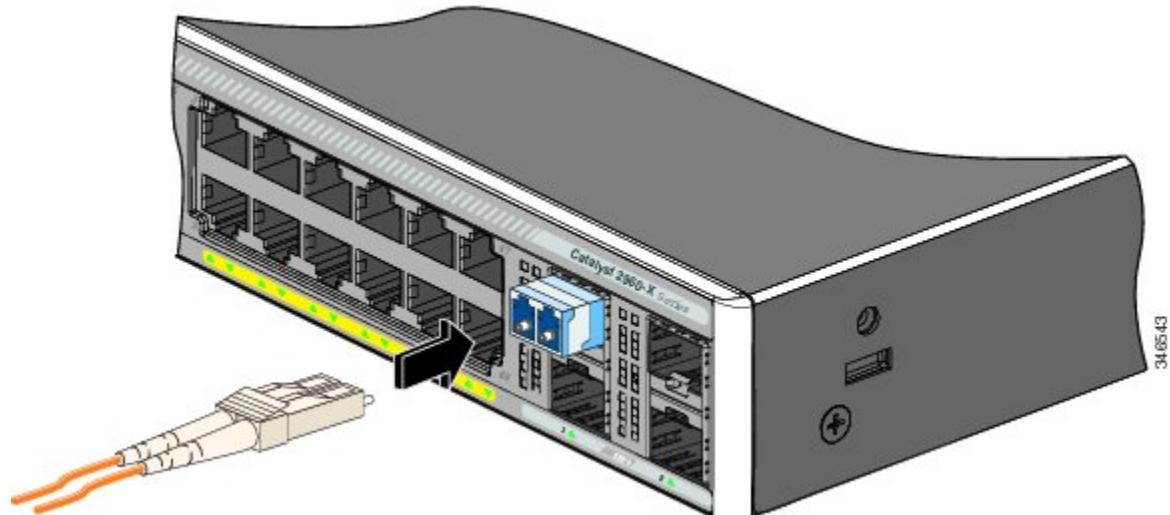


**Caution** Do not remove the rubber plugs from the SFP or SFP+ module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light. Before connecting to the SFP module, be sure that you understand the port and cabling stipulations.

## Procedure

- Step 1** Remove the rubber plugs from the module port and fiber-optic cable, and store them for future use.
- Step 2** Insert one end of the fiber-optic cable into the SFP or SFP+ module port.
- Step 3** Insert the other cable end into a fiber-optic receptacle on a target device.

*Figure 31: Connecting to a Fiber-Optic SFP Module Port*



- Step 4** Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device.

**Related Topics**

[SFP Module Connectors](#), on page 59

## Connecting to 1000BASE-T SFP

When connecting to a 1000BASE-T device, be sure to use a four twisted-pair, Category 5 or higher cable.

**Note**

The automatic medium-dependent interface crossover (auto-MDIX) feature is enabled by default. For configuration information for this feature, see the switch software configuration guide or the switch command reference on Cisco.com.

**Caution**

To prevent ESD damage, follow your normal board and component handling procedures.

### Procedure

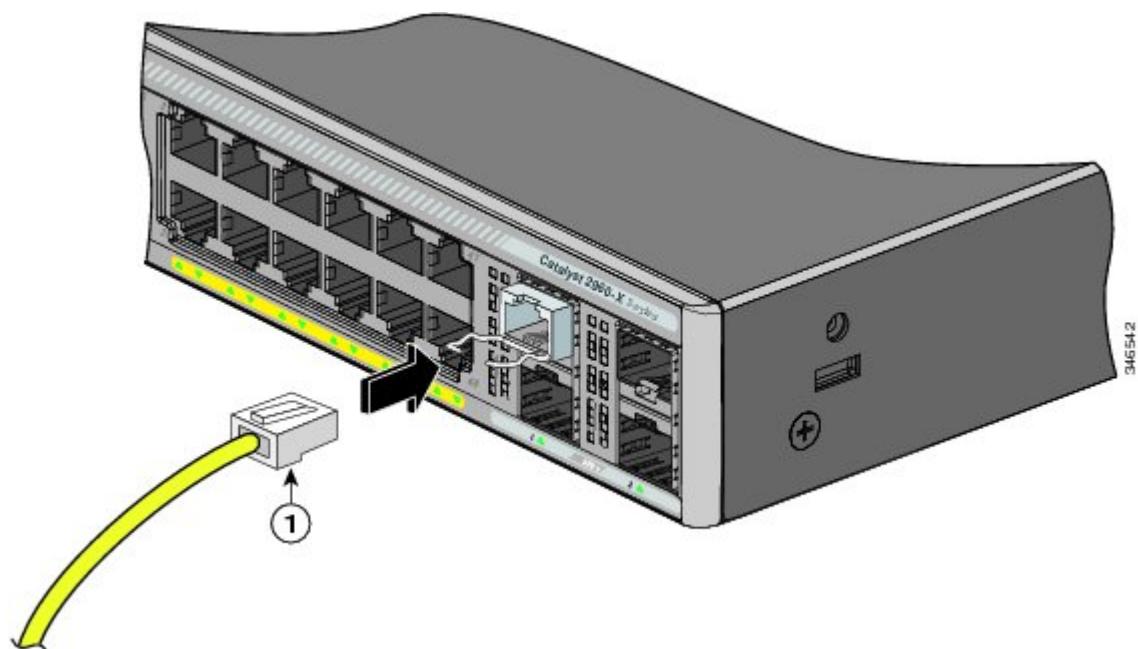
**Step 1**

Connect one end of the cable to the SFP module port. Insert a four twisted-pair, straight-through cable when you connect to servers, workstations, and routers. Insert a four twisted-pair, crossover cable when you connect to switches or repeaters.

**Step 2**

Connect the other end of the cable to an RJ-45 connector on the other device.

*Figure 32: Connecting to a 1000BASE-T SFP Module*



1	RJ-45 connector
---	-----------------

**Step 3** Observe the port status LED.

- The LED turns green when the switch and the other device have an established link.
- The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.
- If the LED is off, the other device might not be turned on, there might be a cable problem, or there might be a problem with the adapter in the other device.

**Step 4** If necessary, reconfigure and restart the switch or other device.

## 10/100/1000 PoE and PoE+Port Connections

The ports provide PoE support for devices compliant with IEEE 802.3af and 802.3at (PoE+), and also provide Cisco prestandard PoE support for Cisco IP Phones and Cisco Aironet Access Points.

On a per-port basis, you can control whether or not a port automatically provides power when an IP phone or an access point is connected.

To access an advanced PoE planning tool, use the Cisco Power Calculator available on Cisco.com at this URL: <http://tools.cisco.com/cpc/launch.jsp>

You can use this application to calculate the power supply requirements for a specific PoE configuration. The results show output current, output power, and system heat dissipation.

**Warning**

Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security. Statement 1072

**Caution**

Category 5e and Category 6 cables can store high levels of static electricity. Always ground the cables to a suitable and safe earth ground before connecting them to the switch or other devices.

**Caution**

Noncompliant cabling or powered devices can cause a PoE port fault. Use only standard-compliant cabling to connect Cisco prestandard IP Phones and wireless access points, IEEE 802.3af, or 802.3at (PoE+) compliant devices. You must remove any cable or device that causes a PoE fault.

### Procedure

**Step 1** Connect one end of the cable to the switch PoE port.

**Step 2** Connect the other end of the cable to an RJ-45 connector on the other device. The port LED turns on when both devices have established link.

The port LED is amber while STP discovers the topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green. If the LED is off, the other device might not be turned on, there might be a cable problem, or there might be a problem with the adapter in the other device.

**Step 3** Reconfigure and reboot the connected device, if needed.

**Step 4** Repeat Steps 1 through 3 to connect each device.

**Note** Many legacy powered devices, including older Cisco IP phones and access points that do not fully support IEEE 802.3af, might not support PoE when connected to the switches by a crossover cable.

## 10/100/1000/Multigigabit Ethernet Port Connections

The switch 10/100/1000 and Multigigabit Ethernet port configuration changes to operate at the speed of the attached device. If the attached ports do not support autonegotiation, you can manually set the speed and duplex parameters. Connecting devices that do not autonegotiate or that have the speed and duplex parameters manually set can reduce performance or result in no linkage.

To maximize performance, choose one of these methods for configuring the Ethernet ports:

- Let the ports autonegotiate both speed and duplex.
- Set the interface speed and duplex parameters on both ends of the connection.

## Auto-MDIX Connections

The autonegotiation and the auto-MDIX features are enabled by default on the switch.

With autonegotiation, the switch port configurations change to operate at the speed of the attached device. If the attached device does not support autonegotiation, you can manually set the switch interface speed and duplex parameters.

With auto-MDIX, the switch detects the required cable type for copper Ethernet connections and configures the interface accordingly.

If auto-MDIX is disabled, use the guidelines in this table to select the correct cable.

**Table 13: Recommended Ethernet Cables (When Auto-MDIX is Disabled)**

Device	Crossover Cable	Straight-Through Cable
Switch to switch	Yes	No
Switch to hub	Yes	No
Switch to computer or server	No	Yes
Switch to router	No	Yes

Device	Crossover Cable	Straight-Through Cable
Switch to IP phone	No	Yes

<sup>5</sup> 100BASE-TX and 1000BASE-T traffic requires twisted four-pair, Category 5 or higher. 10BASE-T traffic can use Category 3 cable or higher.

## Where to Go Next

If the default configuration is satisfactory, the switch does not need further configuration. You can use any of these management options to change the default configuration:

- Start the Network Assistant application, which is described in the getting started guide. Through this GUI, you can configure and monitor a switch cluster or an individual switch.
- Use the CLI to configure the switch as a member of a cluster or as an individual switch from the console.
- Use the Cisco Prime Infrastructure application.
- If you are using Cisco IOS XE Denali 16.1.x and later releases, see the *Configuring the Switch* chapter in this guide for information about setting up the switch.

**Where to Go Next**



## CHAPTER 3

# Troubleshooting

---

This chapter contains these topics:

- [Diagnosing Problems, on page 49](#)
- [Clearing the Switch IP Address and Configuration, on page 52](#)
- [Finding the Serial Number, on page 53](#)
- [Replacing a Failed Stack Member, on page 54](#)

## Diagnosing Problems

The LEDs on the front panel provide troubleshooting information about the switch. They show POST failures, port-connectivity problems, and overall switch performance. You can also get statistics from Device Manager, from the CLI, or from an SNMP workstation.

## Switch POST Results

POST failures are usually fatal. Contact your Cisco technical support representative if your switch does not pass POST.

## Switch LEDs

If you have physical access to the switch, look at the port LEDs for troubleshooting information about the switch. See the LED section for a description of the LED colors and their meanings.

## Switch Connections

### Bad or Damaged Cable

Always examine the cable for marginal damage or failure. A cable might be just good enough to connect at the physical layer, but it could corrupt packets as a result of subtle damage to the wiring or connectors. You can identify this situation because the port has many packet errors or the port constantly flaps (loses and regains link).

- Examine or exchange the copper or fiber-optic cable with a known, good cable.
- Look for broken or missing pins on cable connectors.

- Rule out any bad patch panel connections or media convertors between the source and the destination. If possible, bypass the patch panel, or eliminate faulty media convertors (fiber-optic-to-copper).
- Try the cable in another port or interface, if possible, to see if the problem follows the cable.
- Remove and inspect the stack cable and stack port for bent pins or damaged connectors. If the cable is bad, replace it with a known good cable.

## Ethernet and Fiber-Optic Cables

Make sure that you have the correct cable for the connection.

- For Ethernet, use Category 3 copper cable for 10 Mb/s UTP connections. Use either Category 5, Category 5e, or Category 6 UTP for 10/100/1000 Mb/s connections.
- For fiber-optic cables, verify that you have the correct cable for distance and port type. Ensure that the connected device ports match and use the same type of encoding, optical frequency, and fiber type.
- For copper connections, determine if a crossover cable was used when a straight-through was required or the reverse. Enable auto-MDIX on the switch, or replace the cable.

## Link Status

Verify that both sides have link. A single broken wire or a shutdown port can cause one side to show link even though the other side does not have link.

A port LED that is on does not guarantee that the cable is fully functional. The cable might have encountered physical stress that causes it to function at a marginal level. If the port LED does not turn on:

- Connect the cable from the switch to a known good device.
- Ensure that both ends of the cable are connected to the correct ports.
- Verify that both devices have power.
- Verify that you are using the correct cable type.
- Check for loose connections. Sometimes a cable appears to be seated, but is not. Disconnect the cable and then reconnect it.

## 10/100/1000 Port Connections

A port appears to malfunction:

- Use the Mode button to show the status for all ports.
- Use the **show interfaces** privileged EXEC command to see if the port is error-disabled, disabled, or shutdown. Reenable the port if necessary.

## 10/100/1000 PoE+ Port Connections

A powered device connected to a PoE port does not receive power:

- Use the Mode button to show the PoE status for all ports.

- Use the **show interfaces** privileged EXEC command to see if the port is in error-disabled, disabled, or shutdown. Reenable the port if necessary.
- Verify that the power supply installed in the switch meets the power requirements of your connected devices.
- Verify that there is sufficient PoE power budget to provide power to the attached device. Use the **show power inline** global configuration command to check on the available PoE power budget.
- Verify the cable type. Many legacy powered devices, including older Cisco IP phones and access points that do not fully support IEEE 802.3af, might not support PoE when connected to the switch by a crossover cable. Replace the crossover cable with a straight-through cable.

**Caution**

Noncompliant cabling or powered devices can cause a PoE port fault. Use only standard-compliant cabling to connect Cisco prestandard IP Phones and wireless access points or IEEE 802.3af-compliant devices. You must remove any cable or device that causes a PoE fault.

## SFP and SFP+ Module

Use only Cisco SFP or SFP+ modules in the switch. Each Cisco module has an internal serial EEPROM that is encoded with security information. This encoding provides a way for Cisco to identify and validate that the module meets the requirements for the switch.

- Inspect the SFP module. Exchange the suspect module with a known good module. Verify that the module is supported on this platform. (The switch release notes on Cisco.com list the SFP modules that the switch supports.)
- Use the **show interfaces** privileged EXEC command to see if the port or module is error-disabled, disabled, or shutdown. Reenable the port if needed.
- Make sure that all fiber-optic connections are properly cleaned and securely connected.

## Interface Settings

Verify that the interface is not disabled or powered off. If an interface is manually shut down on either side of the link, it does not come up until you reenable the interface. Use the **show interfaces** privileged EXEC command to see if the interface is error-disabled, disabled, or shutdown on either side of the connection. If needed, reenable the interface.

## Ping End Device

Ping from the directly connected switch first, and then work your way back port by port, interface by interface, trunk by trunk, until you find the source of the connectivity issue. Make sure that each switch can identify the end device MAC address in its Content-Addressable Memory (CAM) table.

## Spanning Tree Loops

STP loops can cause serious performance issues that look like port or interface problems.

A unidirectional link can cause loops. It occurs when the traffic sent by the switch is received by its neighbor, but the traffic from the neighbor is not received by the switch. A broken fiber-optic cable, other cabling problems, or a port issue could cause this one-way communication.

You can enable UniDirectional Link Detection (UDLD) on the switch to help identify unidirectional link problems.

## Switch Performance

### Speed, Duplex, and Autonegotiation

If the port statistics show a large amount of alignment errors, frame check sequence (FCS), or late-collisions errors, this might mean a speed or duplex mismatch.

A common issue with speed and duplex occurs when duplex and speed settings are mismatched between two switches, between a switch and a router, or between the switch and a workstation or server. Mismatches can happen when manually setting the speed and duplex or from autonegotiation issues between the two devices.

To maximize switch performance and to ensure a link, follow one of these guidelines when changing the duplex or the speed settings.

- Let both ports autonegotiate both speed and duplex.
- Manually set the speed and duplex parameters for the interfaces on both ends of the connection.
- If a remote device does not autonegotiate, use the same duplex settings on the two ports. The speed parameter adjusts itself even if the connected port does not autonegotiate.

### Autonegotiation and Network Interface Cards

Problems sometimes occur between the switch and third-party network interface cards (NICs). By default, the switch ports and interfaces autonegotiate. Laptops or other devices are commonly set to autonegotiate, yet sometimes autonegotiation issues occur.

To troubleshoot autonegotiation problems, try manually setting both sides of the connection. If this does not solve the problem, there could be a problem with the firmware or software on your NIC. You can resolve this by upgrading the NIC driver to the latest version.

### Cabling Distance

If the port statistics show excessive FCS, late-collision, or alignment errors, verify that the cable distance from the switch to the connected device meets the recommended guidelines.

## Clearing the Switch IP Address and Configuration

If you have configured a new switch with a wrong IP address, or if all of the switch LEDs start blinking when you are trying to enter Express Setup mode, you can clear the configured IP address. The switch returns to the factory default settings.

**Note**

This procedure clears the IP address and all configuration information stored on the switch. Do not follow this procedure unless you want to completely reconfigure the switch.

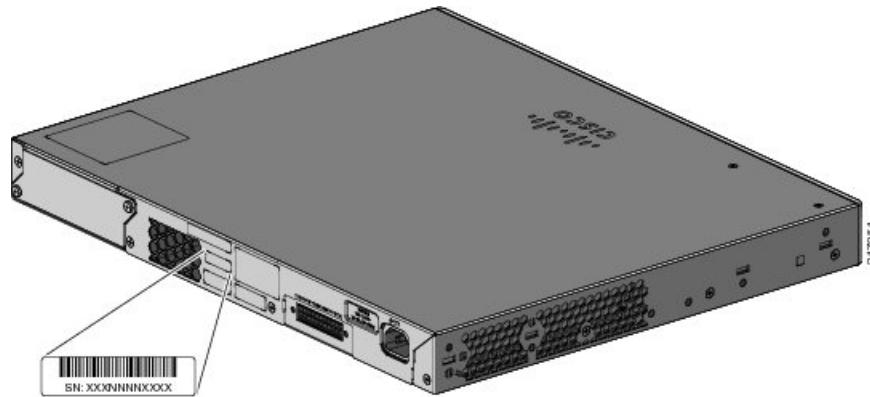
**Procedure**

- Step 1** Press and hold the Mode button. The switch LEDs blink after about 2 seconds. If the switch is not configured, the LEDs above the Mode button turn green. You can omit the next step.
- Step 2** Continue holding down the Mode button. The LEDs stop blinking after 8 seconds, and then the switch reboots. You can now configure the switch by using Express Setup as described in the switch getting started guide. You can also configure the switch by using the CLI setup procedure described in the appendix.

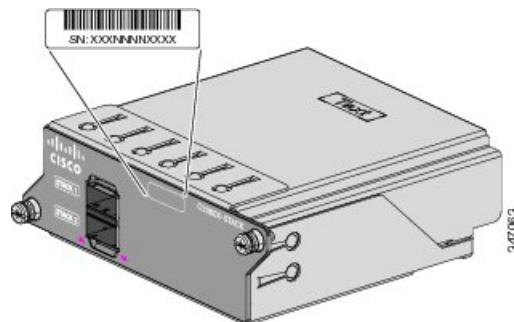
## Finding the Serial Number

If you contact Cisco Technical Assistance, you need to know the switch serial number. You can also use the **show version** privileged EXEC command to see the switch serial number.

*Figure 33: Serial Number Location for the Catalyst 2960-X Switches*



*Figure 34: Serial Number Location for the FlexStack Module*



# Replacing a Failed Stack Member

## Procedure

---

- Step 1** Get a replacement switch that has the same model number as the failed switch.
- Step 2** Power down the failed switch.
- Step 3** Make sure that the replacement switch is off and that the FlexStack module is installed.
- Step 4** Connect the switch to the stack.
- Step 5** Make the same connections on the replacement switch that were on the failed switch.
- Step 6** Reinstall any modules, and make cable connections.
- Step 7** Power on the replacement switch.

The replacement switch has the same configuration for all the interfaces as the failed switch and functions the same as the failed switch.

If you had manually set the member numbers for any stack members, you need to manually assign the replacement switch with the same member number as the failed switch. See the *Catalyst 2960-X Switch Stacking Command Reference* on Cisco.com.

---



## APPENDIX A

# Technical Specifications

This appendix contains these topics:

- [Environmental Specifications, on page 55](#)
- [Specifications for the Catalyst 2960-X Switches, on page 55](#)

## Environmental Specifications

This table describes the environmental specifications.

*Table 14: Environmental Specifications for All Catalyst 2960-X Switches*

Environmental Ranges	
Operating temperature <sup>6</sup>	23 to 113°F (−5 to 45°C) up to 5,000 ft (1500 m) 23 to 104°F (−5 to 40°C) up to 10,000 ft (3000 m)
Storage temperature	−40 to 158°F (−40 to 70°C) up to 15,000 ft (4500 m)
Relative humidity	10 to 95% (noncondensing)
Storage altitude	Up to 15,000 ft (4500 m)

<sup>6</sup> Minimum ambient temperature for cold start is 32°F (0°C)

## Specifications for the Catalyst 2960-X Switches

*Table 15: Catalyst 2960X-48FPD-L, 2960X-48LPD-L, 2960X-24PD-L, 2960X-48FPS-L, 2960X-48LPS-L, and 2960X-24PS-L Switch Specifications*

### Power Requirements

## Technical Specifications

AC input voltage	100 to 240 VAC (autoranging) <ul style="list-style-type: none"> <li>• 9 to 4 A, 50 to 60 Hz (Catalyst 2960X-48FPD-L)</li> <li>• 5 to 2 A, 50 to 60 Hz (Catalyst 2960X-48LPD-L)</li> <li>• 5 to 2 A, 50 to 60 Hz (Catalyst 2960X-24PD-L)</li> <li>• 9 to 4 A, 50 to 60 Hz (Catalyst 2960X-48FPS-L)</li> <li>• 5 to 2 A, 50 to 60 Hz (Catalyst 2960X-48LPS-L)</li> <li>• 5 to 2 A, 50 to 60 Hz (Catalyst 2960X-24PS-L)</li> </ul>
DC input voltage for RPS 2300	<ul style="list-style-type: none"> <li>• +12 V @ 4 A, -53 V @ 15 A (Catalyst 2960X-48FPD-L)</li> <li>• +12 V @ 4 A, -53 V @ 8 A (Catalyst 2960X-48LPD-L)</li> <li>• +12 V @ 3A, -53 V @ 8 A (Catalyst 2960X-24PD-L)</li> <li>• 12 V @ 4 A, -53 V @ 15 A (Catalyst 2960X-48FPS-L)</li> <li>• +12 V @ 4 A, -53 V @ 8 A (Catalyst 2960X-48LPS-L)</li> <li>• +12 V @ 3 A, -53 V @ 8 A (Catalyst 2960X-24PS-L)</li> </ul>
Power consumption	<ul style="list-style-type: none"> <li>• 149 W, 508 BTUs per hour (Catalyst 2960X-48FPD-L)</li> <li>• 103 W, 351 BTUs per hour (Catalyst 2960X-48LPD-L)</li> <li>• 92 W, 313 BTUs per hour (Catalyst 2960X-24PD-L)</li> <li>• 149 W, 508 BTUs per hour (Catalyst 2960X-48FPS-L)</li> <li>• 102 W, 348 BTUs per hour (Catalyst 2960X-48LPS-L)</li> <li>• 90 W, 307 BTUs per hour (Catalyst 2960X-24PS-L)</li> </ul>
Power rating	<ul style="list-style-type: none"> <li>• 0.89 KVA (Catalyst 2960X-48FPD-L)</li> <li>• 0.48 KVA (Catalyst 2960X-48LPD-L)</li> <li>• 0.47 KVA (Catalyst 2960X-24PD-L)</li> <li>• 0.89 KVA (Catalyst 2960X-48FPS-L)</li> <li>• 0.49 KVA (Catalyst 2960X-48LPS-L)</li> <li>• 0.49 KVA (Catalyst 2960X-24PS-L)</li> </ul>
PoE+	

<ul style="list-style-type: none"> <li>• 30 W-per-port maximum, 740-W switch maximum (Catalyst 2960X-48FPD-L and 2960X-48FPS-L switches)</li> <li>• 15.4 W-per-port maximum, 370-W switch maximum (Catalyst 2960X-48LPD-L, 2960X-24PD-L, 2960X-48LPS-L, and 2960X-24PS-L switches)</li> </ul> <p><b>Note</b> The Catalyst 2960X-48LPD-L and 2960X-48LPS-L can support up to 12 ports of PoE+ (30 W-per-port).</p>	
<b>Physical Dimensions</b>	
Weight	<ul style="list-style-type: none"> <li>• 12.9 lb (5.8 kg) (Catalyst 2960X-48FPD-L)</li> <li>• 12.8 lb (5.8 kg) (Catalyst 2960X-48LPD-L)</li> <li>• 12.7 lb (5.8 kg) (Catalyst 2960X-24PD-L)</li> <li>• 13.2 (6.0 kg) (Catalyst 2960X-48FPS-L)</li> <li>• 12.9 lb (5.8 kg) (Catalyst 2960X-48LPS-L)</li> <li>• 12.8 lb (5.8 kg) (Catalyst 2960X-24PS-L)</li> </ul>
Dimensions (H x D x W)	<p>1.75 x 14.50 x 17.5 in. (4.45 x 36.83 x 44.5 cm). Applies to all PoE switches except the Catalyst 2960X-24PSQ-L switch.</p> <p>1.75 x 11.02 x 17.5 in. (4.45 x 28.0 x 44.5 cm). Applies to the Catalyst 2960X-24PSQ-L switch.</p>

<sup>7</sup> Power consumption values for the power consumed internally by the switch at 120 VAC 60 Hz. The information is based on the rating of the power supply (maximum) and does not reflect the actual measured consumption numbers. For the actual power consumption based on measurement, see the data sheet at: [http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps12995/data\\_sheet\\_c78-728232.html](http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps12995/data_sheet_c78-728232.html)

<sup>8</sup> Power rating values for the switch input power.

**Table 16: Catalyst 2960X-48TD-L, 2960X-24TD-L, 2960X-48TS-L, 2960X-24TS-L, 2960X-48TS-LL, 2960X-F24TS-LL, Switch Specifications**

<b>Power Requirements</b>	
AC input voltage	<p>100 to 240 VAC (autoranging)</p> <ul style="list-style-type: none"> <li>• 1 to 0.5 A, 50 to 60 Hz (Catalyst 2960X-48TD-L)</li> <li>• 1 to 0.5 A, 50 to 60 Hz (Catalyst 2960X-24TD-L)</li> <li>• 1 to 0.5, 50 to 60 Hz (Catalyst 2960X-48TS-L)</li> <li>• 1 to 0.5 A, 50 to 60 Hz (Catalyst 2960X-24TS-L)</li> <li>• 1 to 0.5 A, 50 to 60 Hz (Catalyst 2960X-48TS-LL)</li> <li>• 1 to 0.5 A,, 50 to 60 Hz (Catalyst 2960X-24TS-LL)</li> </ul>
DC input voltage for RPS 2300	<ul style="list-style-type: none"> <li>• +12 V @ 4 A, -53 V @ 8 A (Catalyst 2960X-48TD-L)</li> <li>• +12 V @ 3 A, (Catalyst 2960X-24TD-L)</li> <li>• +12 V @ 5 A, (Catalyst 2960X-48TS-L)</li> <li>• +12 V @ 4 A, (Catalyst 2960X-24TS-L)</li> </ul>

Power consumption <sup>9</sup>	<ul style="list-style-type: none"> <li>• 47 W, 161 BTUs per hour (Catalyst 2960X-48TD-L)</li> <li>• 32 W, 110 BTUs per hour (Catalyst 2960X-24TD-L)</li> <li>• 49 W, 168 BTUs per hour (Catalyst 2960X-48TS-L)</li> <li>• 37 W, 126 BTUs per hour (Catalyst 2960X-24TS-L)</li> <li>• 55 W, 187 BTUs per hour (Catalyst 2960X-48TS-LL)</li> <li>• 37 W, 126 BTUs per hour (Catalyst 2960X-24TS-LL)</li> </ul>
Power rating <sup>10</sup>	<ul style="list-style-type: none"> <li>• 0.049 KVA (Catalyst 2960X-48TD-L)</li> <li>• 0.034 KVA (Catalyst 2960X-24TD-L)</li> <li>• 0.051 KVA (Catalyst 2960X-48TS-L)</li> <li>• 0.039 KVA (Catalyst 2960X-24TS-L)</li> <li>• 0.46 KVA (Catalyst 2960X-48TS-LL)</li> <li>• 0.035 KVA (Catalyst 2960X-24TS-LL)</li> </ul>
<b>Physical Dimensions</b>	
Weight	9.6 lb (4.3 kg) Catalyst 2960X-48TD-L
Dimensions (H x D x W)	9.9 lb (4.0 kg) Catalyst 2960X-24TD-L 9.4 lb (4.2 kg) Catalyst 2960X-48TS-L 8.9 lb (4.0 kg) Catalyst 2960X-24TS-L 8.9 lb (4.0 kg) Catalyst 2960X-48TS-LL 8.2 lb (3.7 kg) Catalyst 2960X-24TS-LL 1.75 x 11 x 17.50 in. (4.45 x 27.94 x 44.5 cm) All non-PoE switches.

<sup>9</sup> Power consumption values for the power consumed internally by the switch at 120 VAC 60 Hz. The information is based on the rating of the power supply (maximum) and does not reflect the actual measured consumption numbers. For the actual power consumption based on measurement, see the data sheet at: [http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps12995/data\\_sheet\\_c78-728232.html](http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps12995/data_sheet_c78-728232.html)

<sup>10</sup> Power rating values for the switch input power.



## APPENDIX B

# Connector and Cable Specifications

This appendix contains these topics:

- [Connector Specifications, on page 59](#)
- [Cables and Adapters, on page 60](#)

## Connector Specifications

### 10/100/1000 Ports (Including PoE)

All 10/100/1000 ports use standard RJ-45 connectors and Ethernet pinouts.

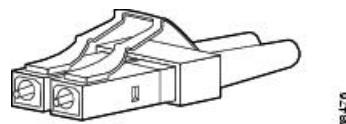
*Figure 35: 10/100/1000 Port Pinouts*

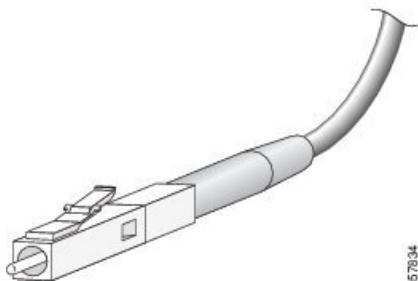
Pin	Label	1	2	3	4	5	6	7	8
1	TP0+								
2	TP0-								
3	TP1+								
4	TP2+								
5	TP2-								
6	TP1-								
7	TP3+								
8	TP3-								

A technical diagram of an RJ-45 port. It shows the eight pins (1 through 8) and their corresponding labels: TP0+, TP0-, TP1+, TP2+, TP2-, TP1-, TP3+, and TP3-. The diagram also shows the physical orientation of the port, with pins 1 through 4 on one side and pins 5 through 8 on the other. A small number '00915' is located in the bottom right corner of the diagram area.

### SFP Module Connectors

*Figure 36: Duplex LC Cable Connector*



**Figure 37: Simplex LC Cable Connector**

57834

**Figure 38: Copper SFP Module LC Connector**

Pin	Label	1 2 3 4 5 6 7 8
1	TP0+	
2	TP0-	
3	TP1+	
4	TP2+	
5	TP2-	
6	TP1-	
7	TP3+	
8	TP3-	

60915

## Cables and Adapters

### Transceiver Module Network Cables

For cabling specifications, refer to the following notes:

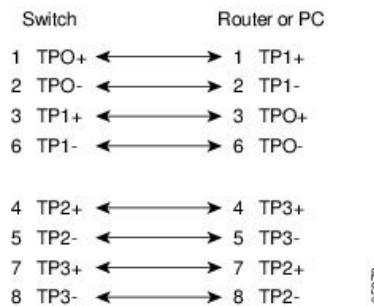
- [Cisco SFP and SFP+ Transceiver Module Installation Notes](#)
- [Cisco 40-Gigabit QSFP+ Transceiver Modules Installation Note](#)

Cisco Catalyst 2960-X and 2960-XR Switches now support QSFP-4X10G-AOC5M, the 40GQSFP to four 10G SFP+ direct attach breakout Active Optical cable assembly.

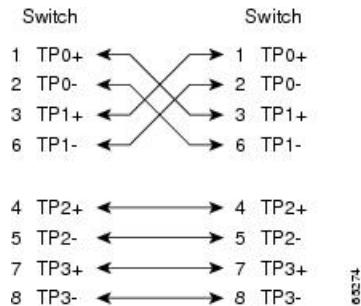
Each port must match the wavelength specifications on the other end of the cable, and the cable must not exceed the stipulated cable length. Copper 1000BASE-T SFP module transceivers use standard four twisted-pair, Category 5 cable at lengths up to 328 feet (100 meters).

## Cable Pinouts

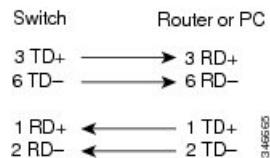
**Figure 39: Four Twisted-Pair Straight-Through Cable Schematic**



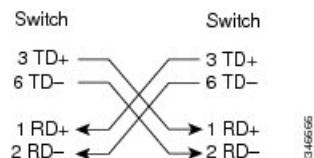
**Figure 40: Four Twisted-Pair Semi-Cross Cable Schematic**



**Figure 41: Two Twisted-Pair Straight-Through Cable Schematic**



**Figure 42: Two Twisted-Pair Crossover Cable Schematic**

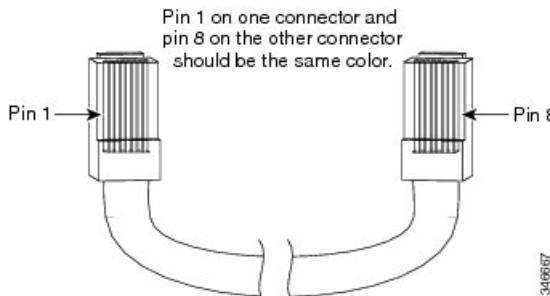


### Identifying a Crossover Cable

To identify a crossover cable, compare the two modular ends of the cable. Hold the cable ends side-by-side, with the tab at the back. The wire connected to the pin on the outside of the left plug should be a different color from the wire connected to the pin on the inside of the right plug.

## Console Port Adapter Pinouts

*Figure 43: Identifying a Crossover Cable*



## Console Port Adapter Pinouts

The RS-232 console port uses an 8-pin RJ-45 connector. Use an RJ-45-to-DB-9 adapter cable to connect the switch console port to a console PC. You need to provide a RJ-45-to-DB-25 female DTE adapter to connect the switch console port to a terminal.

*Table 17: Console Port Signaling with a DB-9 Adapter*

Switch Console Port (DTE)	RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	DB-9 Pin	Signal
RTS	8	CTS
DTR	6	DSR
TxD	2	RxD
GND	5	GND
GND	5	GND
RxD	3	TxD
DSR	4	DTR
CTS	7	RTS

*Table 18: Console Port Signaling with a DB-25 Adapter*

Switch Console Port (DTE)	RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	DB-25 Pin	Signal
RTS	5	CTS
DTR	6	DSR
TxD	3	RxD
GND	7	GND

Switch Console Port (DTE)	RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	DB-25 Pin	Signal
GND	7	GND
RxD	2	TxD
DSR	20	DTR
CTS	4	RTS





## APPENDIX C

# Configuring the Switch

This appendix contains these topics:

- [Accessing the CLI Through Express Setup, on page 65](#)
- [Accessing the CLI Through the Console Port, on page 65](#)
- [Entering the Initial Configuration Information, on page 70](#)

## Accessing the CLI Through Express Setup

You can access the CLI on an unconfigured switch. Set the switch in Express Setup mode and connect a switch Ethernet port to an Ethernet port on your PC or workstation. Follow the steps described in the getting started guide for turning on the switch and using Express Setup.

When the switch is in Express Setup mode, open a Telnet session to the switch by entering the IP address 10.0.0.1. Enter the **setup** user EXEC command. Enter the information described in [IP Settings, on page 70](#) and [Completing the Setup Program, on page 70](#).

After you have entered the configuration information for the switch, save it to flash memory by using the **write memory** privileged EXEC command.



**Note**

In Express Setup mode, the IP address 10.0.0.1 remains active on the switch until you enter the **write memory** command. You lose the Telnet connection after entering the **write memory** command.

## Accessing the CLI Through the Console Port

You can access the CLI on a configured or unconfigured switch by connecting the RJ-45 console port or USB console port of the switch to your PC or workstation and accessing the switch through a terminal emulation program.



**Note**

If you have stacked your switches, connect to the console port of one of the switches in the stack. You can initially configure the entire stack from any member switch.

## Connecting the RJ-45 Console Port

### Procedure

---

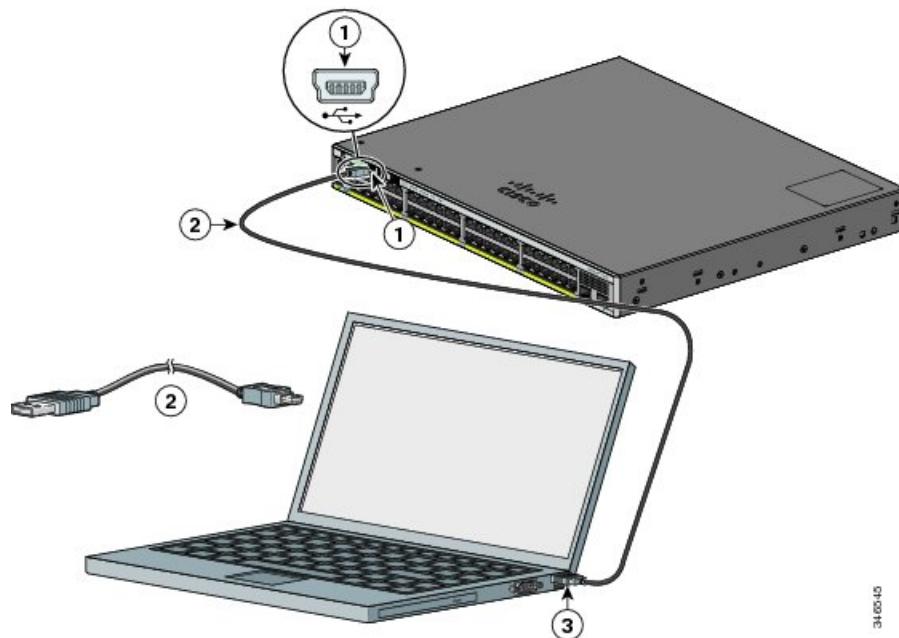
- Step 1** Connect the RJ-45-to-DB-9 adapter cable to the 9-pin serial port on the PC. Connect the other end of the cable to the switch console port.
- Step 2** Start the terminal-emulation program on the PC or the terminal. The program, frequently a PC application such as HyperTerminal or ProcommPlus, makes communication between the switch and your PC or terminal possible.
- Step 3** Configure the baud rate and character format of the PC or terminal to match the console port default characteristics:
- 9600 baud
  - 8 data bits
  - 1 stop bit
  - No parity
  - None (flow control)
- Step 4** Power on the switch as described in the switch getting started guide.
- Step 5** The PC or terminal displays the bootloader sequence. Press **Enter** to display the setup prompt.
- 

## Connecting the USB Console Port

### Procedure

---

- Step 1** If you are connecting the switch USB console port to a Windows-based PC for the first time, install the USB driver. See [Installing the Cisco Microsoft Windows USB Device Driver](#), on page 68.
- Note** USB Type A port on the switch provides file system support and is **NOT** a console port. See [USB Type A Port](#) section.

**Figure 44: Connecting the USB Console Cable to the Switch**

1	USB console port (5-pin mini-Type B)	3	USB Type A connection on the laptop
2	USB Type A to 5-pin mini-Type B cable		

**Step 2** Connect a USB cable to the PC USB port. Connect the other end of the cable to the switch mini-B (5-pin-connector) USB console port.

**Step 3** Start the terminal-emulation program on the PC or the terminal. The program, frequently a PC application such as HyperTerminal or ProcommPlus, makes communication between the switch and your PC or terminal possible.

**Step 4** Configure the baud rate and character format of the PC or terminal to match the console port default characteristics:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity
- None (flow control)

**Step 5** Power on the switch as described in the switch getting started guide.

**Step 6** The PC or terminal displays the bootloader sequence. Press **Enter** to display the setup prompt. Follow the steps in the Setup program.

## Installing the Cisco Microsoft Windows USB Device Driver

A USB device driver must be installed the first time a Microsoft Windows-based PC is connected to the USB console port on the switch.

### Installing the Cisco Microsoft Windows XP USB Driver

#### Procedure

---

- Step 1** Obtain the Cisco USB console driver file from the Cisco.com web site and unzip it.

**Note** You can download the driver file from the Cisco.com site for downloading the switch software.

- Step 2** If using 32-bit Windows XP, double-click the setup.exe file in the Windows\_32 folder. If using 64-bit Windows XP, double-click the setup(x64).exe file in the Windows\_64 folder.

- Step 3** The Cisco Virtual Com InstallShield Wizard begins.

- Step 4** The Ready to Install the Program window appears. Click **Install**.

- Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.

- Step 6** Connect the USB cable to the PC and the switch console port. The USB console port LED turns green, and the Found New Hardware Wizard appears. Follow the instructions to complete the driver installation.
- 

### Installing the Cisco Microsoft Windows 2000 USB Driver

#### Procedure

---

- Step 1** Obtain the Cisco USB console driver file from the Cisco.com web site and unzip it.

**Note** You can download the driver file from the Cisco.com site for downloading the switch software.

- Step 2** Double-click the setup.exe file.

- Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.

- Step 4** The Ready to Install the Program window appears. Click **Install**.

- Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.

- Step 6** Connect the USB cable to the PC and the switch console port. The USB console port LED turns green, and the Found New Hardware Wizard appears. Follow the instructions to complete the driver installation.
- 

### Installing the Cisco Microsoft Windows 7 USB Driver

#### Procedure

---

- Step 1** Obtain the Cisco USB console driver file from the Cisco.com web site and unzip it.

**Note** You can download the driver file from the Cisco.com site for downloading the switch software.

**Step 2** If using 32-bit Windows 7, double-click the setup.exe file in the Windows\_32 folder. If using 64-bit Windows 7, double-click the setup(x64).exe file in the Windows\_64 folder.

**Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click **Next**.

**Step 4** The Ready to Install the Program window appears. Click **Install**.

**Note** If a User Account Control warning appears, click **Allow - I trust this program** to proceed.

**Step 5** The InstallShield Wizard Completed window appears. Click **Finish**.

**Step 6** Connect the USB cable to the PC and the switch console port. The USB console port LED turns green, and the Found New Hardware Wizard appears. Follow the instructions to complete the driver installation.

---

## Uninstalling the Cisco Microsoft Windows USB Driver

### Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver

Use the Windows Add or Remove Programs utility or the setup.exe file.

#### Using the Setup.exe Program

##### Before you begin

Disconnect the switch console terminal before uninstalling the driver.

##### Procedure

---

**Step 1** Run setup.exe for Windows 32-bit or setup(x64).exe for Windows-64bit. Click **Next**.

**Step 2** The InstallShield Wizard for Cisco Virtual Com appears. Click **Next**.

**Step 3** When the Program Maintenance window appears, select the Remove radio button. Click **Next**.

**Step 4** When the Remove the Program window appears, click **Remove**.

**Step 5** When the InstallShield Wizard Completed window appears, click **Finish**.

---

#### Using the Add or Remove Programs Utility

##### Before you begin

Disconnect the switch console terminal before uninstalling the driver.

##### Procedure

---

**Step 1** Click **Start > Control Panel > Add or Remove Programs**.

**Step 2** Scroll to Cisco Virtual Com and click **Remove**.

- Step 3** When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.

## Uninstalling the Cisco Microsoft Windows 7 USB Driver

### Before you begin

Disconnect the switch console terminal before uninstalling the driver.

### Procedure

- Step 1** Run setup.exe for Windows 32-bit or setup(x64).exe for Windows-64bit. Click **Next**.
- Step 2** The InstallShield Wizard for Cisco Virtual Com appears. Click **Next**.
- Step 3** When the Program Maintenance window appears, select the Remove radio button. Click **Next**.
- Step 4** When the Remove the Program window appears, click **Remove**.
- Note** If a User Account Control warning appears, click **Allow - I trust this program to proceed**.
- Step 5** When the InstallShield Wizard Completed window appears, click **Finish**.

## Entering the Initial Configuration Information

To set up the switch, you need to complete the setup program, which runs automatically after the switch is powered on. You must assign an IP address and other configuration information necessary for the switch to communicate with the local routers and the Internet. This information is also needed to use Device Manager or Cisco Network Assistant to configure and manage the switch.

## IP Settings

Obtain this information from your network administrator before you start the setup program:

- Switch IP address
- Subnet mask (IP netmask)
- Default gateway (router)
- Enable secret password
- Enable password
- Telnet password

## Completing the Setup Program

If your switches are stacked and there are multiple console connections to individual switches in the stack, the initial setup dialog box appears at the console where you first press **Enter**.

## Procedure

- Step 1** Enter Yes at these two prompts:

```
Would you like to enter the initial configuration dialog? [yes/no]: yes
```

```
At any point you may enter a question mark '?' for help.  
Use ctrl-c to abort configuration dialog at any prompt.  
Default settings are in square brackets '[]'.
```

```
Basic management setup configures only enough connectivity  
for management of the system, extended setup will ask you  
to configure each interface on the system.
```

```
Would you like to enter basic management setup? [yes/no]: yes
```

- Step 2** Enter a host name for the switch, and press **Return**.

On a command switch, the host name is limited to 28 characters; on a member switch the name is limited to 31 characters. Do not use *-n*, where *n* is a number, as the last character in a host name for any switch.

```
Enter host name [Switch]: host_name
```

- Step 3** Enter an enable secret password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, can start with a number, is case sensitive, allows spaces, but ignores leading spaces. The secret password is encrypted, and the enable password is in plain text.

```
Enter enable secret: secret_password
```

- Step 4** Enter an enable password, and press **Return**.

```
Enter enable password: enable_password
```

- Step 5** Enter a virtual terminal (Telnet) password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, is case sensitive, allows spaces, but ignores leading spaces.

```
Enter virtual terminal password: terminal-password
```

- Step 6** To configure the country code, enter yes and press **Return**.

```
Do you want to configure country code? [no]: yes
```

- Step 7** Enter the country code, and press **Return**.

```
Enter the country code[US]:us
```

- Step 8** (Optional) Configure Simple Network Management Protocol (SNMP) by responding to the prompts. You can also configure SNMP later through the CLI, Device Manager, or the Network Assistant application. To configure SNMP later, enter **no**.

```
Configure SNMP Network Management? [no]: no
```

- Step 9** Enter the interface name (physical interface or VLAN name) of the connection to the management network, and press **Return**. For this release, always use **vlan1** as that interface.

```
Enter interface name used to connect to the  
management network from the above interface summary: vlan1
```

- Step 10** Configure the interface by entering the switch IP address and subnet mask and pressing **Return**. The IP address and subnet masks shown are examples.

```
Configuring interface vlan1:  
Configure IP on this interface? [yes]: yes  
IP address for this interface: 10.4.120.106  
Subnet mask for this interface [255.0.0.0]: 255.0.0.0
```

- Step 11** Enter **Y** to configure the switch as the cluster command switch. Enter **N** to configure it as a member switch or as a standalone switch.

If you enter **N**, the switch appears as a candidate switch in the Network Assistant GUI. You can configure the switch as a command switch later through the CLI, Device Manager, or the Network Assistant application. To configure it later, enter **no**.

```
Would you like to enable as a cluster command switch? [yes/no]: no
```

You have now completed the initial configuration of the switch. This is an example of the configuration output that appears:

```
The following configuration command script was created:  
hostname switch1  
enable secret 5 $1$Ulq8$D1A/OiaEb190WcBPd9cOn1  
enable password enable_password  
line vty 0 15  
password terminal-password  
no snmp-server  
!  
no ip routing  
  
!  
interface Vlan1  
no shutdown  
ip address 10.4.120.106 255.0.0.0  
!  
interface GigabitEthernet1/0/1  
!  
interface GigabitEthernet1/0/2  
  
interface GigabitEthernet1/0/3  
!  
...<output abbreviated>
```

```
!  
  
interface GigabitEthernet1/0/23  
!  
end
```

**Step 12**

From these choices that appear, make your selection and press **Return**.

[0] Go to the IOS command prompt without saving this config.

[1] Return back to the setup without saving this config.

[2] Save this configuration to nvram and exit.

Choose (2) to save the configuration to NVRAM to use it the next time the switch reboots.

Enter your selection [2]:**2**

The switch now runs this default configuration. If you want to change this configuration or perform other management tasks, see [Management Options, on page 17](#).

---

