



## **Cisco Catalyst 9500X Series Switches Hardware Installation Guide**

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# CHAPTER 1

## Preface

- [Document Conventions](#) , on page 1
- [Related Documentation](#), on page 3
- [Obtaining Documentation and Submitting a Service Request](#), on page 3

## Document Conventions

This document uses the following conventions:

Convention	Description
^ or Ctrl	Both the ^ symbol and Ctrl represent the Control (Ctrl) key on a keyboard. For example, the key combination <b>^D</b> or <b>Ctrl-D</b> 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 font</b>	Commands and keywords and user-entered text appear in <b>bold font</b> .
<i>Italic font</i>	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic font</i> .
Courier font	Terminal sessions and information the system displays appear in <code>courier font</code> .
<b>Bold Courier font</b>	<b>Bold Courier font</b> indicates text that the user must enter.
[x]	Elements in square brackets are optional.
...	An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.
	A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.
[x   y]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
{x   y}	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.

Take note of the following general safety warnings:



---

**Warning** **Statement 1071**—Warning Definition**IMPORTANT SAFETY INSTRUCTIONS**

Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Read the installation instructions before using, installing, or connecting the system to the power source. Use the statement number at the beginning of each warning statement to locate its translation in the translated safety warnings for this device.

SAVE THESE INSTRUCTIONS



---

**Warning** **Statement 1089**—Instructed and Skilled Person Definitions

An instructed person is someone who has been instructed and trained by a skilled person and takes the necessary precautions when working with equipment.

A skilled person or qualified personnel is someone who has training or experience in the equipment technology and understands potential hazards when working with equipment.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

---

## Related Documentation



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**Note** Before installing or upgrading the switch, refer to the switch Release Notes.

- Cisco Catalyst 9500 Series Switches documentation, located at: <http://www.cisco.com/go/c9500>
- Cisco SFP and QSFP modules documentation, including compatibility matrixes, located at: <https://tmgmatrix.cisco.com/>
- Cisco Validated Designs documents, located at: <http://www.cisco.com/go/designzone>

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.





## CHAPTER 2

# Product Overview

The Cisco Catalyst 9500X Series Switches family consists of fixed aggregation layer switches supporting redundant power supplies and modular fans. The Catalyst 9500X Series Switches provide support for the following features:

- Higher number of 50G/100G/400G ports.
- Advanced security capabilities like MACSec-256 and TrustWorthy systems.
- IoT integration and policy-based automation from the edge to the cloud with SD-Access solution.
- RJ-45 and USB Type C console ports.
- Supports SATA SSD storage for container-based application hosting on select switch models.
- [Switch Models, on page 5](#)
- [Front Panel, on page 6](#)
- [Rear Panel, on page 12](#)

## Switch Models

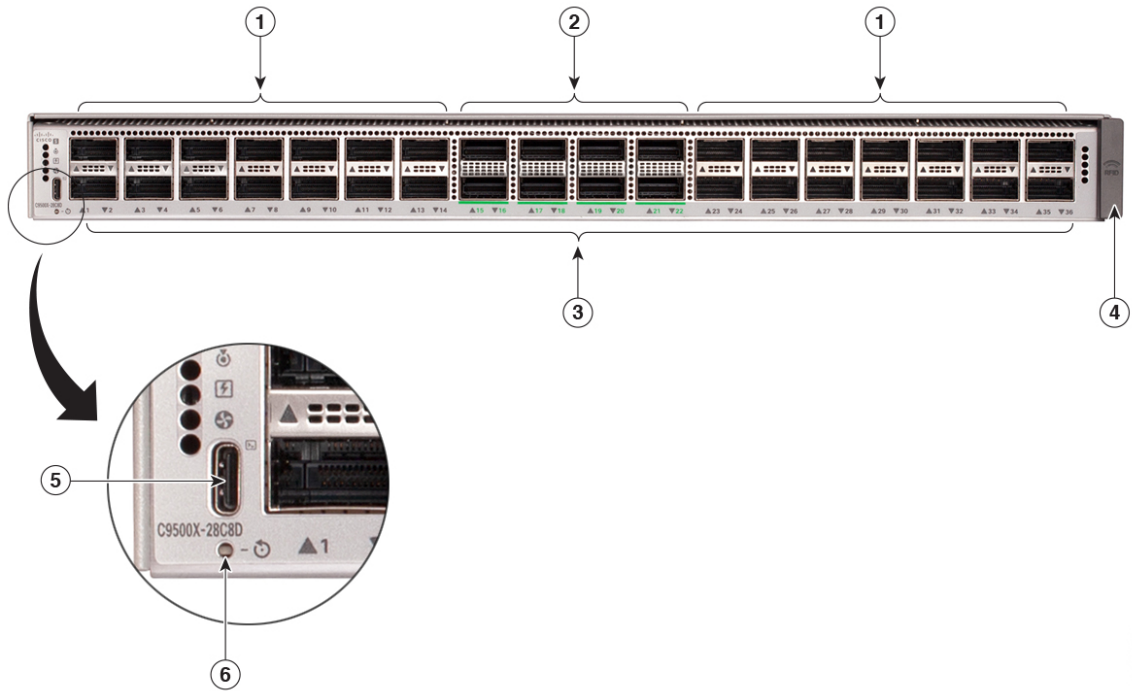
**Table 1: Cisco Catalyst 9500X Series Switches Models**

Switch Model	Description
C9500X-28C8D	28x100G QSFP28 and 8x400G QSFP-DD ports; 2 power supply slots
C9500X-60L4D	60x50G SFP56 and 4x400G QSFP-DD ports; 2 power supply slots <sup>1</sup>

<sup>1</sup> For 1G speed, a maximum of eight SFP-1G-LH and/or SFP-1G-SX transceiver modules in SFP56 ports are supported per system.

# Front Panel

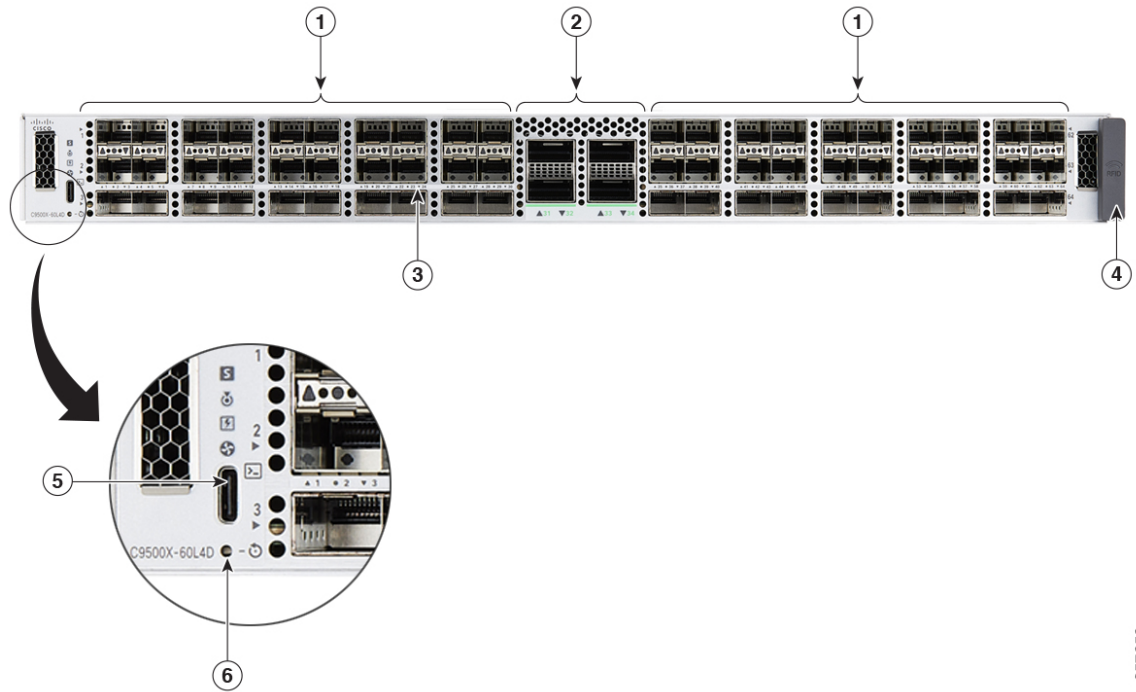
Figure 1: Front Panel of C9500X-28C8D



357675

1	28 x 100 G QSFP28 ports	4	RFID (Optional)
2	8 x 400 G QSFP-DD ports	5	USB-C console port
3	Port LEDs	6	Reset button

Figure 2: Front Panel of C9500X-60L4D



357858

1	60 x 50 G SFP56 ports	4	RFID (Optional)
2	4 x 400 G QSFP-DD ports	5	USB-C console port
3	Port LEDs	6	Reset button

## SFP and QSFP Module Ports

The SFP and QSFP modules provide copper or fiber-optic connections to other devices. The SFP and QSFP module ports for Cisco Catalyst 9500X Series Switches are as follows :

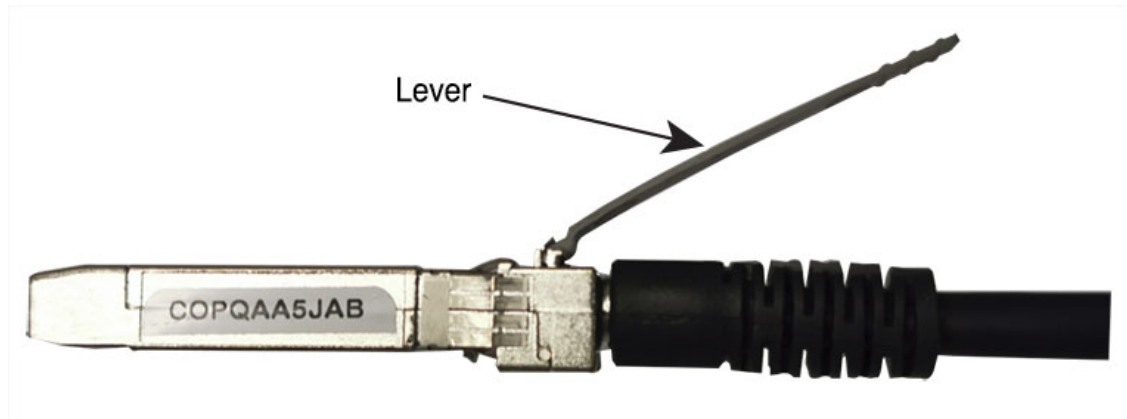
Table 2: Cisco Catalyst 9500X Series Switch Models

Switch model	Supported ports
C9500X-28C8D	Supports 28x100G/40G QSFP28 and 8x400G/200G/100G/40G QSFP-DD modules. The switch also supports 10G with QSA on QSFP28 and QSFP-DD ports.
C9500X-60L4D	Supports 60x50G/25G/10G SFP56 and 4x400G/200G/100G/40G QSFP-DD modules. The switch also supports 10G with QSA on QSFP-DD ports.

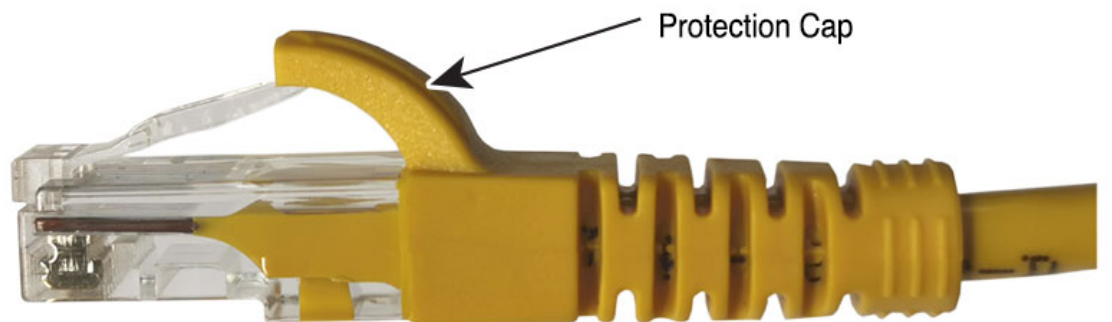


**Note** With the C9500X-60L4D model:

- Do not use the SFP-H10GB-CU1M/1.5M/2M/2.5M/3M/5M and SFP-10G-AOC1M/2M/3M/5M/7M/10M types of SFP modules from TE Connectivity, because the lever on these modules might interfere with other parts of the switch.



- On a SFP-10G-T-X SFP module, do not use an RJ-45 cable with a protection cap because the protruding cap might interfere with other parts of the switch.



### Support for Breakout Cables

Breakout cables enable a single 40G QSFP+ interface to be split into four 10G SFP+ interfaces and a single 100G QSFP28 interface into four 25G SFP28 interfaces.

Breakout cables are only supported on the odd numbered QSFP28 ports of C9500X-28C8D. However, you can use breakout cables in any of the QSFPDD ports.

Breakout cables are only supported on the QSFPDD ports of C9500X-60L4D.

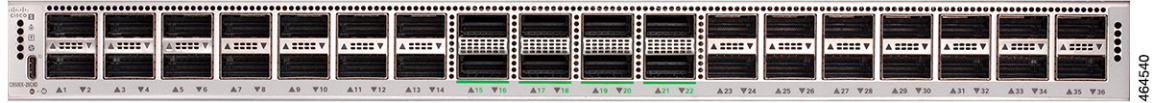
For supported SFP and QSFP modules, refer to the Cisco Transceiver Modules Compatibility Information at <https://tmgmatrix.cisco.com/>.

## Port Mapping for Cisco Catalyst 9500X Series Switches

The following figures show how the ports are numbered on different Cisco Catalyst 9500X Series Switches.

### C9500X-28C8D

Figure 3: Native Port Numbering for C9500X-28C8D



Port Type	Port Number on the Switch
100G native ports	1—14, 23—36
400G native ports	15—22

Breakout is supported on all the QSFP-DD ports and the odd numbered QSFP28 ports on a C9500X-28C8D.

Table 3: Port mapping for QSFP28 Ports on C9500X-28C8D

40G/100G native ports	Configurable 25G/10G ports with Breakout Cable
1	1/0/1/1, 1/0/1/2, 1/0/1/3, 1/0/1/4
3	1/0/3/1, 1/0/3/2, 1/0/3/3, 1/0/3/4
5	1/0/5/1, 1/0/5/2, 1/0/5/3, 1/0/5/4
7	1/0/7/1, 1/0/7/2, 1/0/7/3, 1/0/7/4
9	1/0/9/1, 1/0/9/2, 1/0/9/3, 1/0/9/4
11	1/0/11/1, 1/0/11/2, 1/0/11/3, 1/0/11/4
13	1/0/13/1, 1/0/13/2, 1/0/13/3, 1/0/13/4
23	1/0/23/1, 1/0/23/2, 1/0/23/3, 1/0/23/4
25	1/0/25/1, 1/0/25/2, 1/0/25/3, 1/0/25/4
27	1/0/27/1, 1/0/27/2, 1/0/27/3, 1/0/27/4
29	1/0/29/1, 1/0/29/2, 1/0/29/3, 1/0/29/4
31	1/0/31/1, 1/0/31/2, 1/0/31/3, 1/0/31/4
33	1/0/33/1, 1/0/33/2, 1/0/33/3, 1/0/33/4
35	1/0/35/1, 1/0/35/2, 1/0/35/3, 1/0/35/4

Table 4: Port mapping for QSFP-DD Ports on C9500X-28C8D

400G native ports	Configurable 40G/10G ports with Breakout Cable
15	1/0/15/1, 1/0/15/2, 1/0/15/3, 1/0/15/4
16	1/0/16/1, 1/0/16/2, 1/0/16/3, 1/0/16/4
17	1/0/17/1, 1/0/17/2, 1/0/17/3, 1/0/17/4
18	1/0/18/1, 1/0/18/2, 1/0/18/3, 1/0/18/4
19	1/0/19/1, 1/0/19/2, 1/0/19/3, 1/0/19/4
20	1/0/20/1, 1/0/20/2, 1/0/20/3, 1/0/20/4
21	1/0/21/1, 1/0/21/2, 1/0/21/3, 1/0/21/4
22	1/0/22/1, 1/0/22/2, 1/0/22/3, 1/0/22/4

For more information about how to configure a breakout interface, see "Configuring Breakout Interfaces" section in the *Interface and Hardware Components Configuration Guide*.

### C9500X-60L4D

Figure 4: Native Port Numbering for C9500X-60L4D



Port Type	Port Number on the Switch
50G native ports	1—30, 35—64
400G native ports	31—34

Table 5: Port mapping for QSFP-DD Ports on C9500X-60L4D

400G native ports	Configurable 40G/10G ports with Breakout Cable
31	1/0/31/1, 1/0/31/2, 1/0/31/3, 1/0/31/4
32	1/0/32/1, 1/0/32/2, 1/0/32/3, 1/0/32/4
33	1/0/33/1, 1/0/33/2, 1/0/33/3, 1/0/33/4
34	1/0/34/1, 1/0/34/2, 1/0/34/3, 1/0/34/4

## RFID Tag

The chassis has a built-in, front-facing, passive RFID tag that uses UHF RFID technology and requires an RFID reader with compatible software. It provides auto-identification capabilities for asset management and tracking. The RFID tags are compatible with the Generation 2 GS1 EPC Global Standard and are ISO 18000-6C compliant. They operate in the 860- to 960-MHz UHF band. For more information, see [Radio Frequency Identification \(RFID\) on Cisco Catalyst 9000 Family Switches White Paper](#).

For Catalyst 9500 Series Switches, the **RFID tag is optional**. Based on your requirements, you can choose to order the switch with or without an RFID tag at the time of purchase through the PID.

## Management Port

The Ethernet management port, also referred to as the Gi0/0 or GigabitEthernet0/0 port, is a VRF (VPN routing/forwarding) interface to which you can connect a PC. It supports TFTP image downloading, network management, SNMP, Telnet, and SSH connections. The switches support out-of-band management through the Mgmt-vrf. Mgmt-vrf is used to segment management traffic from the global routing table of the switch. The Ethernet management port supports speeds upto 10/100/1000 Mbps and is set to auto-negotiate.

## USB Host Ports

USB host ports lets you connect different USB devices such as flash drives to the switch. The USB 3.0 port provides support for Cisco USB flash drives with capacities from 64 MB to 16 GB. 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.

The USB 3.0 port is located on the rear panel.

## Mode Button

The mode button has the following function:

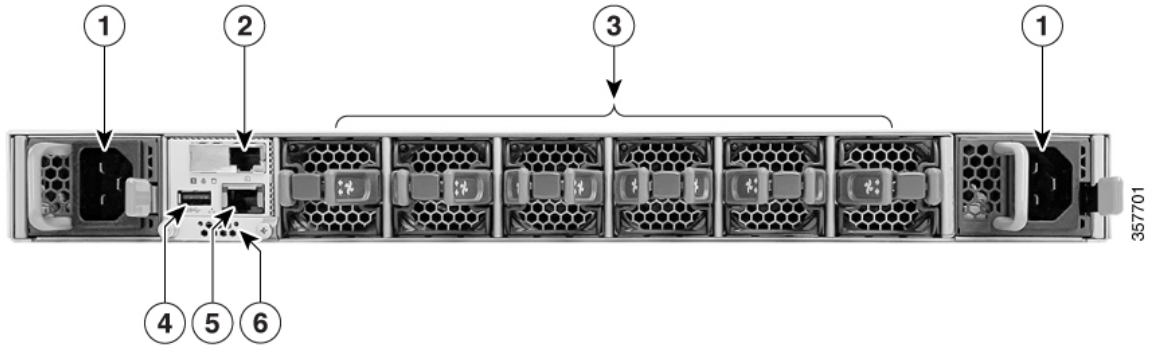
- Reset Mode — works as a reset button to trigger system reset

### Reset Mode

Pressing the mode button for five seconds triggers the system power cycle.

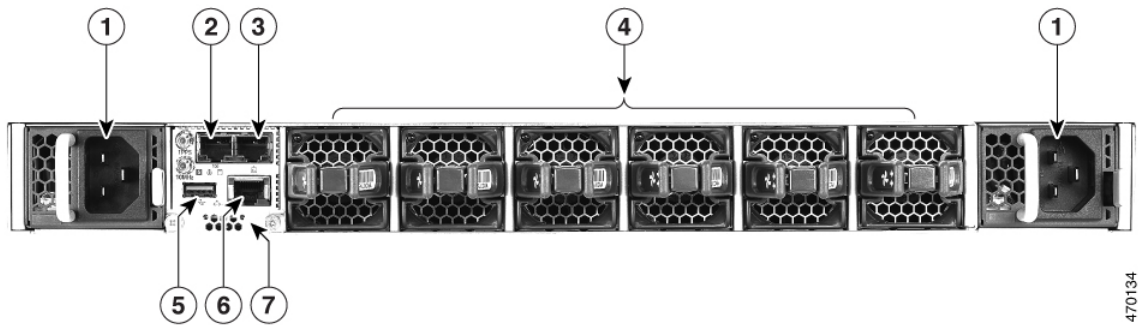
# Rear Panel

Figure 5: Rear panel of C9500X-28C8D



1	2 power supply modules	4	USB 3.0 host port
2	RJ45 console port	5	RJ45 Ethernet management port
3	6 fan modules	6	SSD Module

Figure 6: Rear panel of C9500X-60L4D



1	2 power supply modules	4	6 fan modules
2	RJ45 Sync Timing Port	5	USB 3.0 host port
3	RJ45 console port	6	RJ45 Ethernet management port
7	SSD Module	-	

## Console Ports

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

- RJ-45 console port (EIA/TIA-232). The RJ-45 console port connection uses an RJ-45-to-DB-9 female cable.



- USB-C console port

If you use USB-C console ports, 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.

**Figure 7: USB-C Console 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 Configuration Guide for Catalyst 9500 Switches.

## SATA SSD Module

To support the storage needs on the switch, the Cisco Catalyst 9500X Series Switches provide support for pluggable Serial Advanced Technology Attachment (SATA) Solid State Drive (SSD) module. The SSD module storage capacity ranges are 240GB, 480GB and 960GB. SATA SSD works as a general-purpose storage device. The storage drive can also be used to save packet captures and trace logs generated by the operating system.

## Power Supply Slots

The switch has two power supply slots that accept AC and DC input power supplies. The power supply modules are field replaceable units (FRUs) and are hot-swappable. The chassis is delivered with one power supply pre-installed in the power supply slot. If only one power supply is ordered, then a blank cover is installed in the empty power supply slot, which must remain installed if a power supply is not installed.

The following table describes the internal power supply modules supported on different switch models:

**Table 6: Internal Power Supply Modules**

Part Number	PSU Modules	Switches Supported
C9K-PWR-1500WAC	1500-W AC platinum certified power supply module	C9500X-28C8D C9500X-60L4D
C9K-PWR-1500WDC	1500-W DC platinum certified power supply module	

## Fan Modules

The Cisco Catalyst 9500X Series switch supports field-replaceable, variable-speed modular fans with default front-to-back airflow. It also supports fan modules with back-to-front airflow. These fan units support Online Insertion and Removal (OIR) for up to 120 seconds. The fan unit is responsible for cooling the entire chassis and interfacing with environmental monitors to trigger alarms when conditions exceed thresholds.

The following table describes the fan modules supported on different switch models.

**Table 7: Fan Modules**

Part Number	Fan Modules	Switches Supported
C9500X-FAN-1U-R	Front to back cooling fan	C9500X-28C8D
C9500X-FAN-1U-F	Back to front cooling fan	C9500X-60L4D

For more information, see [Fan Module Overview](#), on page 54.



## CHAPTER 3

# Preparing for Installation

- [Safety Warnings, on page 15](#)
- [Site Requirements, on page 17](#)

## Safety Warnings



---

**Warning** **Statement 1008**—Class 1 Laser Product

This product is a Class 1 laser product.

---



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**Warning** **Statement 1017**—Restricted Area

This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

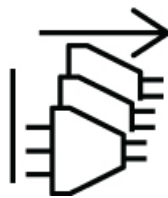
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**Warning** **Statement 1028**—More Than One Power Supply

This unit might have more than one power supply connection. To reduce risk of electric shock, remove all connections to de-energize the unit.





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**Warning Statement 1032**—Lifting the Chassis

To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules, such as power supplies, fans, or cards. These types of handles are not designed to support the weight of the unit.

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**Warning Statement 9001**—Product Disposal

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

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**Warning Statement 1046**—Installing or Replacing the Unit

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.

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**Warning Statement 1074**—Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

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**Warning Statement 1051**—Laser Radiation

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.

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**Warning Statement 1091**—Installation by an Instructed Person

Only an instructed person or skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of an instructed or skilled person.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

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**Warning Statement 1073**—No User-Serviceable Parts

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

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**Warning Statement 1029**—Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they reduce the risk of electric shock and fire, they contain electromagnetic interference (EMI) that might disrupt other equipment, and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

## Site Requirements

Planning a proper location for the switch and layout of the equipment rack or wiring closet is essential for successful system operation. These sections describe some of the basic site requirements that you should be aware of as you prepare to install your switch, including the following:

- Environmental factors can adversely affect the performance and longevity of your system.
- Install the switch in an enclosed, secure area, ensuring that only qualified personnel have access to the switch and control of the environment.
- Equipment that is placed too closely together or that is inadequately ventilated may cause system over-temperature conditions, leading to premature component failure.
- Poor equipment placement can make chassis panels inaccessible and difficult to maintain.
- The switch requires a dry, clean, well-ventilated, and air-conditioned environment.
- To ensure normal operation, maintain ambient airflow. If the airflow is blocked or restricted, or if the intake air is too warm, an over-temperature condition may occur. The switch environmental monitor may then shut down the system to protect the system components.
- Multiple switches can be rack mounted with little or no clearance above and below the chassis. However, when mounting a switch in a rack with other equipment, or when placing it on the floor near other equipment, ensure that the exhaust from other equipment does not blow into the air intake vent of the switch chassis.

## Temperature

Temperature extremes may cause a system to operate at reduced efficiency and cause a variety of problems, including premature aging and failure of chips, and failure of mechanical devices. Extreme temperature fluctuations may also cause chips to become loose in their sockets. Observe the following guidelines:

- Ensure that the chassis has adequate ventilation.
- Do not place the chassis within a closed-in wall unit or on top of cloth, which can act as thermal insulation.
- Do not place the chassis where it will receive direct sunlight, particularly in the afternoon.
- Do not place the chassis next to a heat source of any kind, including heating vents.
- Adequate ventilation is particularly important at high altitudes. Make sure that all the slots and openings on the system remain unobstructed.

- Clean the installation site at regular intervals to avoid buildup of dust and debris, which may cause a system to overheat.
- If system is exposed to abnormally low temperatures, allow a two hour warm up period, in ambient temperature no lower than 32°F (0 °C) before turning on.

Failure to observe these guidelines may damage the chassis' internal components.

## Air Flow

The switch is designed to be installed in an environment where there is a sufficient volume of air available to cool the supervisor engines, modules, and power supplies. If there are any constraints with regard to the free flow of air through the chassis, or if the ambient air temperature is elevated, the switch environmental monitor may then shut down the system to protect the system components.

To maintain proper air circulation through the switch chassis, we recommend that you maintain a minimum space of 6 inches (15 cm) between a wall and the chassis and power supply unit air intakes or a wall and the chassis and power supply unit hot air exhausts. In situations where the switch chassis are installed in adjacent racks, you should allow a minimum space of 12 inches (30.5 cm) between the air intake of one chassis and the hot air exhaust of another chassis. Failure to maintain adequate spacing between chassis may cause the switch chassis that is drawing in the hot exhaust air to overheat and fail.

If you are installing your switch in an enclosed or partially enclosed rack, we strongly recommend that you verify that your site meets the following guidelines:

- Verify that the ambient air temperature within the enclosed or partially enclosed rack is within the chassis operating temperature limits. After installing the chassis in the rack, power up the chassis and allow the chassis temperature to stabilize (approximately 2 hours).

Measure the ambient air temperature at the chassis air intake grill by positioning an external temperature probe 1 inch (2.5 cm) away from the chassis left side, and centered on the chassis both horizontally and vertically.

Measure the ambient air temperature at the power supply unit air intake grill by positioning an external temperature probe 1 inch (2.5 cm) away from the chassis front, centered on the power supply unit section located above the card slots.

- With a C9500X-FAN-1U-R fan module, if the ambient intake air temperature is less than 109°F (45°C) at altitudes of 6,000 feet and below, the rack meets the intake air temperature criterion. At altitudes above that threshold and up to 10,000 feet (3000 m), the air intake should not exceed 104°F (40°C).
- With a C9500X-FAN-1U-F fan module, if the ambient intake air temperature is less than 95°F (35°C) at altitudes of 6,000 feet and below, the rack meets the intake air temperature criterion. At altitudes above that threshold and up to 10,000 feet (3000 m), the air intake should not exceed 86°F (30°C).
- If the ambient intake air temperature exceeds this recommendation, the system may experience a major temperature alarm with maximum fan speeds in response. If ambient temperature continues to increase, system will respond with protective shut down.
- Plan ahead. A switch that is currently installed in an enclosed or partially enclosed rack might meet ambient air temperature and air flow requirements at present. However, if you add more chassis to the rack or more modules to a chassis in the rack, the additional heat generated might cause the ambient air

temperature at the chassis or power supply unit inlets to exceed recommended conditions which may trigger thermal alarms.

If installation conditions for inlet temperature and airflow are marginal or not fully met, activate the fan tray's NEBS mode, which has more aggressive programming to address restricted spacing and elevated ambient temperatures. This should result in reduced thermal alarms along with greater acoustic noise and increased power consumption associated with higher fan speeds.

## Humidity

High-humidity conditions may cause moisture to enter the system, and cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. Extreme moisture buildup inside the system may result in electrical short circuit, which may cause serious damage to the system. Each system is rated for storage and operation in 10 to 95 percent relative humidity, non-condensing with a humidity gradation of 10 percent per hour. Buildings in which climate is controlled by air-conditioning in the warmer months and by heat during the colder months usually maintain an acceptable level of humidity for system equipment. However, if a system is located in an unusually humid location, a dehumidifier should be used to maintain the humidity within an acceptable range.

## Altitude

Operating a system at high altitude (low pressure) reduces the efficiency of forced and convection cooling and may result in electrical problems related to arcing and corona effects. This condition may also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or perform at reduced efficiency.

## Dust and Particles

A clean operating environment can greatly reduce the negative effects of dust and other particles, which act as insulators and interfere with the mechanical components in the system.

## Air Quality

Dust is everywhere and often invisible to the naked eye. It consists of fine particles in the air that originate from various sources, such as soil dust lifted by weather, from volcanic eruptions, or pollution. Dust at an installation site may contain small amounts of textile, paper fibers, or minerals from outdoor soil. It may also contain natural contaminants, such as chlorine from the marine environment and industrial contaminants such as sulfur. Ionized dust and debris are dangerous and get attracted to electronic equipment.

The accumulation of dust and debris on electronic equipment has the following adverse effects:

- It increases the operating temperature of the equipment. According to the Arrhenius effect, an increase in the operating temperature leads to a decrease in reliability and life of the equipment.
- The moisture and corrosive elements that are present in the dust can corrode the electronic or mechanical components and cause premature board failure.

These adverse effects are further accelerated by the presence of fans in the data networking equipment that ingest dust and other particles into the equipment. Higher the volume of air that is generated by the fans for cooling, the higher the quantity of dust and particulates that get deposited and trapped inside the equipment.

Remove or minimize the presence of dust and particulates at the installation site by following the guidelines mentioned in ANSI 71-04-2013 regulations.



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**Note** In addition to the guidelines mentioned in ANSI 71-04-2013 regulations, follow all applicable guidelines as per site conditions to remove or minimize other contaminants.

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## Corrosion

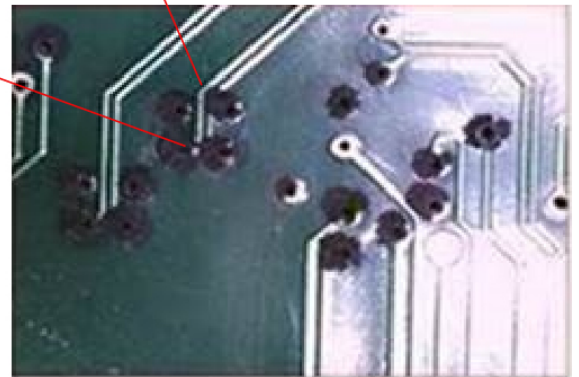
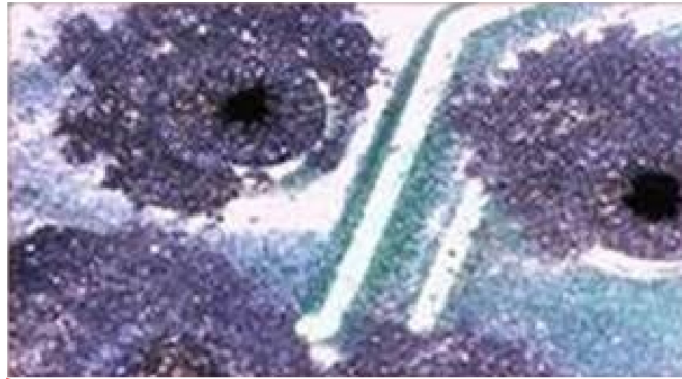
Corrosion is a chemical reaction that occurs between electronic components and gases which results in metal deterioration. Corrosion attacks edge connectors, pin connectors, IC plug-in sockets, wirewraps, and all other metal components. Depending on the type and concentration level of the corrosive gases, performance degradation of the components occurs either rapidly or over a period of time. It also leads to blocked currents, brittle connection points, and overheated electrical systems. Corrosion by-products form insulating layers on circuits and causes electronic failure, short circuits, pitting, and metal loss.

A type of corrosion known as creep corrosion, that primarily affects PCBA (Printed Circuit Board Assembly) occurs when the PCBA is subjected to a harsh, and sulfur-rich (hydrogen sulfide) end-use environment over a prolonged period of time. The corrosion begins on certain exposed metals, such as copper and silver, and then creeps along the remaining metal surface either causing electrical short circuits or creating holes. Creep corrosion also occurs on electronic components such as resistors and PCBs.

To prevent corrosion, remove or minimize the presence of dust and particulates at the installation site by following the guidelines mentioned in ANSI 71-04-2013 regulations.



*Figure 8: A PCB with Corrosion on its Metal Contacts*



## EMI and Radio Frequency Interference

Electro-Magnetic interference (EMI) and radio frequency interference (RFI) from a system can adversely affect devices such as radio and television (TV) receivers operating near the system. Radio frequencies emanating from a system can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on the system monitor. RFI is defined as any EMI with a frequency above 10 kilohertz (kHz). This type of interference can travel from the system to other devices through the power cable and power source, or through the air in the form of transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of harmful interference emitted by computing equipment. Each system meets these FCC regulations. To reduce the possibility of EMI and RFI, follow these guidelines:

- Always operate the system with the chassis covers installed.
- Ensure that all chassis slots are covered by a metal filler bracket and that an unused power supply bay has a metal cover plate installed.
- Ensure that the screws on all peripheral cable connectors are securely fastened to their corresponding connectors on the back of the chassis.
- Always use shielded cables with metal connector shells for attaching peripherals to the system.

When wires are run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires. This fact has two implications for the construction of plant wiring:

- Bad wiring practice can result in radio interference emanating from the plant wiring.
- Strong EMI, especially when it is caused by lightning or radio transmitters, can destroy the signal drivers and receivers in the chassis, and even create an electrical hazard by conducting power surges through lines into equipment.




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**Note** To predict and provide a remedy for strong EMI, consult experts in RFI.

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If you use twisted-pair cable in your plant wiring, include a good distribution of grounding conductors to reduce EMI. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.

If the wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.




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**Caution** The intra-building ports (Copper-Based Ethernet Ports) of the equipment or subassembly is suitable for connection to inside a building or unexposed wiring or cabling only. If the intra-building ports of the equipment or subassembly is metallically connected to interfaces that connect to the Out Side Plant (OSP) or its wiring, the metallic-connection **MUST NOT** be more than 6 meters (approximately 20 feet). These interfaces are designed for use as intra-building interfaces only (Type 2, 4, or 4a ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to an OSP wiring system.

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## Shock and Vibration

The equipment complies with the Earthquake, Office, and Transportation Vibration, and Equipment Handling Criteria of GR-63-CORE.

## Power Source Interruptions

Systems are especially sensitive to variations in voltage supplied by the AC power source. Overvoltage, undervoltage, and transients (or spikes) can erase data from memory or even cause components to fail. To protect against these types of problems, power wiring ground conductors should always be properly grounded. Also, place the system on a dedicated power circuit (rather than sharing a circuit with other heavy electrical equipment). In general, do not allow the system to share a circuit with any of the following:

- Copy machines
- Air conditioners
- Vacuum cleaners
- Space heaters

- Power tools
- Teletype machines
- Laser printers
- Facsimile machines
- Any other motorized equipment

Besides these appliances, the greatest threats to a system's power supply are surges or blackouts that are caused by electrical storms. Whenever possible, turn off the system and peripherals, if any, and unplug them from their power sources during thunderstorms. If a blackout occurs—even a temporary one—while the system is turned on, turn off the system immediately and disconnect it from the electrical outlet. Leaving the system on may cause problems when the power is restored; all other appliances left on in the area may create large voltage spikes that may damage the system.

## System Grounding



**Warning** **Statement 1046**—Installing or Replacing the Unit

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.



**Caution** Installations that rely solely on system grounding that uses only an AC third-prong ground run a substantially greater risk of equipment problems and data corruption than those installations that use both the AC third-prong ground and a properly installed system ground.

The following table lists some general grounding practice guidelines.

**Table 8: Grounding Practice Guidelines**

Environment	Electromagnetic Noise Severity Level	Grounding Recommendations
Commercial building is subjected to direct lightning strikes.  For example, some places in the United States, such as Florida, are prone to more lightning strikes than other areas.	High	All lightning protection devices must be installed in strict accordance with manufacturer recommendations. Conductors carrying lightning current should be spaced away from power and data lines in accordance with applicable recommendations and building codes. Best grounding practices must be closely followed.

Environment	Electromagnetic Noise Severity Level	Grounding Recommendations
Commercial building is located in an area where lightning storms occur frequently, but is not prone to direct lightning strikes.	High	Best grounding practices must be closely followed.
Commercial building contains a mix of information technology equipment and industrial equipment, such as welding.	Medium to High	Best grounding practices must be closely followed.
Existing commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment. This installation has a history of malfunction due to electromagnetic noise.	Medium	Best grounding practices must be closely followed. Determine source and cause of noise if possible, and mitigate as closely as possible at the noise source or reduce coupling from the noise source to the victim equipment.
New commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment.	Low	Best grounding practices should be followed as closely as possible. Electromagnetic noise problems are not anticipated, but installing a best-practice grounding system in a new building is often the least expensive route, and the best way to plan for the future.
Existing commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment.	Low	Best grounding practices should be followed as much as possible. Electromagnetic noise problems are not anticipated, but installing a best-practice grounding system is always recommended.



**Note** Grounding lugs must be installed on the location marked on the chassis only.

## Maintaining Safety with Electricity

When working on electrical equipment, follow these guidelines:

- Do not work alone if potentially hazardous conditions exist anywhere in your work space.
- Never assume that power is disconnected from a circuit; always check the circuit before working on it.
- When the power is switched off, put a lock-box on the circuit, so that no one can accidentally switch it on.
- Look carefully for possible hazards in your work area, such as damp floors, ungrounded power extension cables, frayed or damaged power cords, and missing safety grounds.

- If an electrical accident occurs, proceed as follows:
  - Use extreme caution; do not become a victim yourself.
  - Disconnect power from the system.
  - Seek medical attention, if necessary.
- Use the product within its marked electrical ratings and product usage instructions.
- Install the product in compliance with local and national electrical codes.
- If any of the following conditions occur, contact the Cisco Technical Assistance Center:
  - The power cable or plug is damaged.
  - An object has fallen into the product.
  - The product has been exposed to water or other liquids.
  - The product has been dropped or shows signs of damage.
  - The product does not operate correctly when you follow the operating instructions.
- Use the correct external power source. Operate the product only from the type of power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult a local electrician.
- To help prevent electrical shock, plug all the power cables into properly grounded electrical outlets. These power cables are equipped with three-prong plugs to ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a power cable.
- Observe power strip ratings. Make sure that the total current rating of all products that are plugged into the power strip does not exceed 80 percent of the power strip rating.
- Do not modify power cables or plugs yourself. Consult with a licensed electrician or your power company for site modifications. Always follow your local and national wiring codes.

## Preventing ESD Damage

ESD damage might occur when modules or other FRUs are improperly handled, resulting in intermittent or complete failure of the modules or FRUs. Modules consist of printed circuit boards that are fixed in metal carriers. EMI shielding and connectors are integral components of a carrier. Although the metal carrier helps to protect the board from ESD, always use an ESD-grounding strap when handling modules. To prevent ESD damage, follow these guidelines:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use an available ejector lever to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use an available ejector lever to release the bus connectors from the backplane or midplane.

- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.



## CHAPTER 4

# Installing a Switch

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:

- [Installation Tasks, on page 27](#)
- [Contents of the Shipping Box, on page 28](#)
- [Spare Accessory Kits, on page 30](#)
- [Unpacking the Switch, on page 30](#)
- [Establishing the System Ground, on page 30](#)
- [Installing the Switch, on page 34](#)

## Installation Tasks

After you prepare your site for installation, follow these tasks to install the switch:

Task	Description
<a href="#">Unpacking the Switch</a>	Remove the switch from the packaging material. <b>Note</b> Save the packaging material for later use if you need to move the chassis.
<a href="#">Installing the Switch</a>	Install the switch.
<a href="#">Connecting the System Ground</a>	Construct and attach a system ground wire from the building (earth) ground to the system ground point on the chassis.
<a href="#">Installing Power Supply</a>	Power supplies that are ordered with the switch are preinstalled in the switch. If ordered separately, install the power supplies.
<a href="#">Installing a Fan Module</a>	Install the fan modules in the fan module slots.

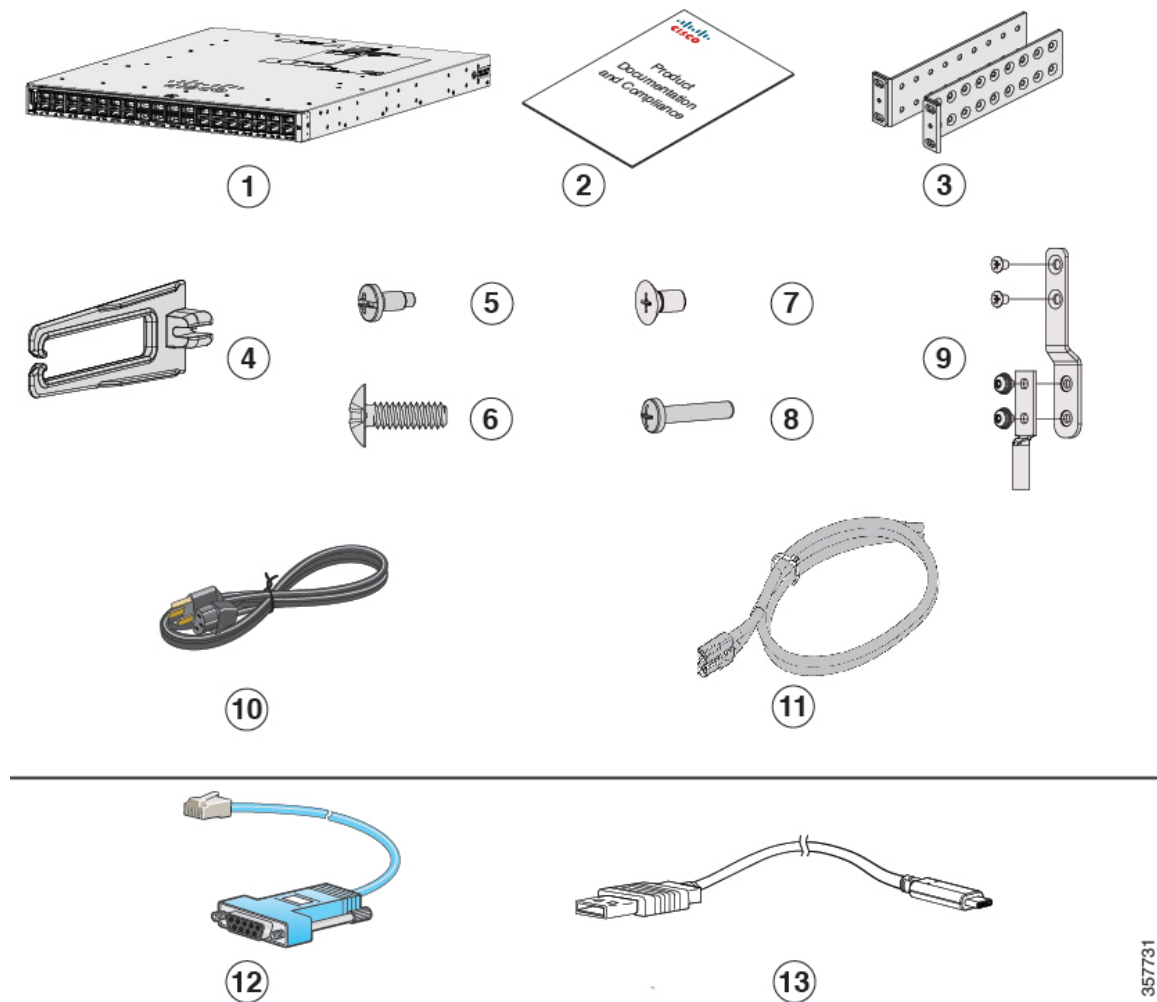
Task	Description
<a href="#">Connector and Cable Specifications</a>	The various ports on the chassis must be connected to the network. This process can involve only attaching a network interface cable to the port or it can include the installation of a transceiver of some type in port and then attaching the network interface cable to the transceiver.
Powering up the chassis	After completing the network cabling and making sure that system ground is connected, the power supplies can be turned on. The system powers up and runs through a set of built-in diagnostics.

## Contents of the Shipping Box

The shipping box contains the model of the switch you ordered and other components needed for installation. Some components are optional, depending on your order.



Figure 9: Components Delivered in the Shipping Box of Cisco Catalyst 9500X Series Switches



1	Cisco Catalyst 9500X Series switch (power supply and fan modules not shown)	8	One M4.0 x 20mm Phillips pan-head screw (Black color)
2	Product documentation and compliance document	9	Ground lug and four M4.0 x 6mm screws (two pan-head and two flat-head screws)
3	Two 19-inch mounting brackets	10	(Optional) AC power cord <sup>2</sup>
4	Cable guide	11	(Optional) DC power cord <sup>1</sup>
5	Four number-12 Phillips pan-head 0.50" long screws	12	(Optional) RJ-45 console cable <sup>1</sup>
6	Four number-10 Phillips pan-head 0.625" long screws	13	(Optional) USB console cable <sup>1</sup>
7	12 M4.0 x 6mm Phillips flat-head screws	-	-

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- Note**
1. The item is orderable.
  2. The item is orderable. You can choose the type of AC cord as per your requirement.

## Spare Accessory Kits

The following table describes the spare accessory kits supported on different switch models:

**Table 9: Spare Accessory Kits and Rack Mount Kits for Cisco Catalyst 9500X Series Switches**

Part Number	Description	Switches Supported
C9500X-ACCKIT-19I=	19" rack mount accessory kit for Cisco Catalyst 9500X Series switches.	C9500X-28C8D C9500X-60L4D
C9500X-ACCKIT-23I=	23" rack mount accessory kit for Cisco Catalyst 9500X Series switches.	
C9500X-4PTH-KIT=	Extension rails and brackets for four-point mounting for Cisco Catalyst 9500X Series switches.	

## Unpacking the Switch



- Note** Do not discard the shipping container when you unpack the switch. Flatten the shipping cartons and store them with the pallet. You will need these containers if you need to move or ship the switch in the future.

Check the contents of the accessory kit. Verify that you received all listed equipment, which should include the following:

- Grounding lug and disposable ESD strap.
- Optional equipment that you ordered, such as console cables, transceivers, or special connectors.
- Blank covers are installed for the power supply slots on the chassis.

## Establishing the System Ground

This section describes how to connect a system ground to the switch.



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**Caution** Installations that rely solely on system grounding using only an AC third-prong ground run a substantially greater risk of equipment problems and data corruption than those installations that use both the AC third-prong ground and a properly installed system ground.

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The system ground provides additional grounding for EMI shielding requirements and grounding for the low voltage supplies (DC-DC converters) on the modules. You must observe the following system grounding guidelines for your chassis:

- You must install the system ground connection with any other rack or system power ground connections that you make. The system ground connection is required if FXS modules are installed or if this equipment is installed in a U.S. or European Central Office.
- You must connect both the system ground connection and the power supply ground connection to an earth ground. The system ground connection is required if FXS modules are installed or if this equipment is installed in a U.S. or European Central Office.
- When using DC-input power supplies, you must install the system ground before you attach the source DC power cables to the DC PEM. Power down the chassis before attaching the system ground.



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**Note** In all situations, grounding practices must comply with Section 250 of the National Electric Code (NEC) requirements or local laws and regulations. A 6 AWG grounding wire is recommended from the chassis to the rack ground or directly to the common bonding network (CBN). The equipment rack should also be connected to the CBN with 6 AWG grounding wire.

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**Note** The system ground serves as the primary safety ground for chassis that are equipped with DC-input power supplies. The DC-input power supplies for these chassis do not have a separate ground.

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## Required Tools and Equipment

To connect the system ground, you need the following tools and materials:

- Grounding lug — When using the double-hole lug connector provided with the system, the ground wire must be 6 AWG only. Otherwise, a supported closed-loop ring connector must be used for 8-14 AWG wire.
- Grounding screws — Two M4.0 x 6mm Phillips pan-head screws. Supplied as part of the accessory kit.
- Grounding wire — Not supplied as part of accessory kit. The grounding wire should be sized according to local and national installation requirements. For U.S. installations, AC power supply systems require a 14 AWG copper conductor. Commercially available 8-14 AWG wire is recommended. DC power supply systems with 930W power supply module require a 12 AWG wire and 1500W power supply module require a 8 AWG wire. The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.
- No. 1 Phillips screwdriver.
- Crimping tool to crimp the grounding wire to the grounding lug.

- Wire-stripping tool to remove the insulation from the grounding wire.

## Connecting the System Ground

To establish an earth ground for the chassis, you must attach a grounding cable from the chassis' grounding lug to the rack.

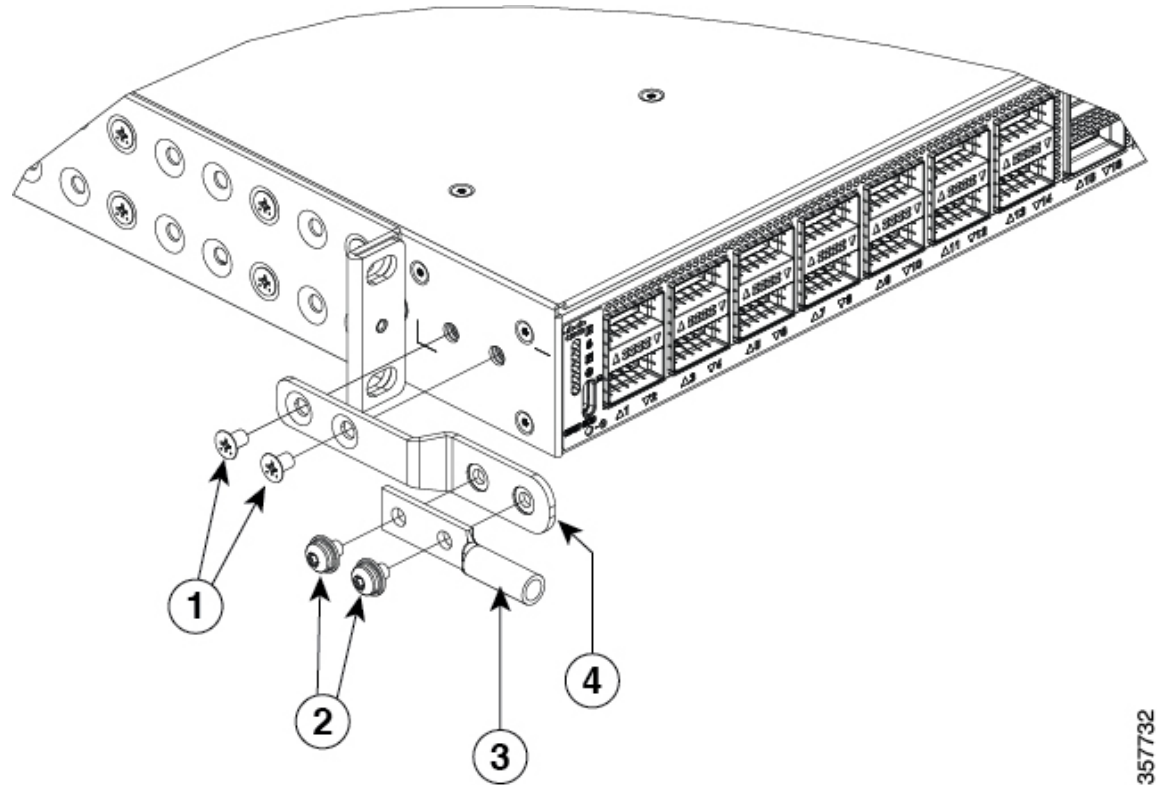
### Procedure

- 
- Step 1** Use a wire-stripping tool to remove approximately 0.75 inch (19 mm) of the covering from the end of the grounding wire.
  - Step 2** Insert the stripped end of the grounding wire into the open end of the grounding lug.
  - Step 3** Crimp the grounding wire in the barrel of the grounding lug. Verify that the ground wire is securely attached to the ground lug.
  - Step 4** Place the grounding wire lug against the grounding pad on the switch, making sure that there is solid metal-to-metal contact.

You can install the grounding lug on the left or the right side of the chassis; the grounding pad on C9500X switches are located on the sides of the chassis.

- Step 5** Before you secure the lug to the chassis, make sure that the grounding lug and the grounding wire do not interfere with other switch hardware or rack equipment. Secure the grounding bracket and the lug to the chassis with two M4.0x 6mm flat-head screws.

Figure 10: Installing the Grounding Lug on a C9500X Switch

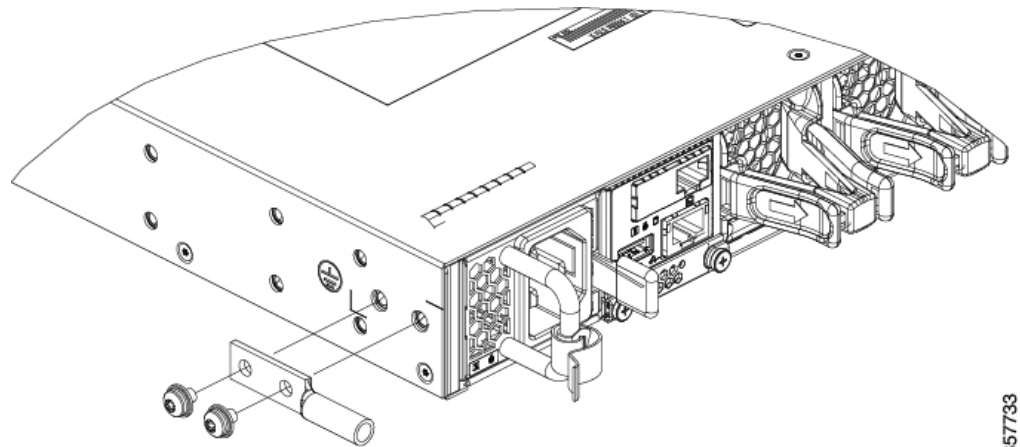


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1	M4.0 x 6mm flat-head screws	3	Grounding lug
2	M4.0 x 6mm pan-head screws	4	Grounding bracket

**Note** In situations where there is no interference with the rack, other switch hardware or rack equipment, you can install the lug directly on to the chassis without the grounding bracket.

Figure 11: Installing the Lug Without Grounding Bracket



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- Step 6** Prepare the other end of the grounding wire with a ring lug, and secure it to the rack with a screw.
- 

## Installing the Switch

### Rack-Mounting

- For Network Equipment Building Systems (NEBS) installation, use the four post rack mount kit. The depth of the rack, measured between the front-mounting and the rear-mounting strips must be between 24.72 inches and 39.75 inches.
- Ensure you read the Regulatory Compliance and Safety Information (RCSI) before installing the switch.
- Installation in racks 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.
- 

**Warning**

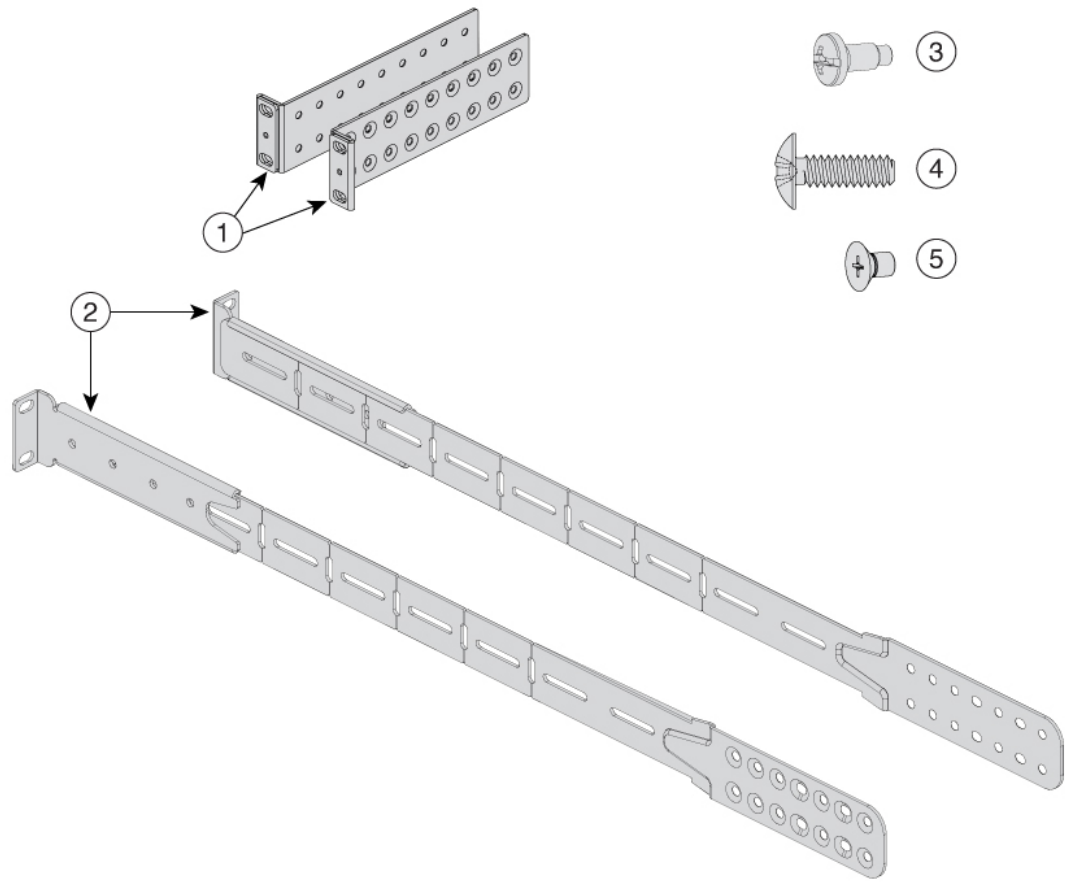
**Statement 1006**—Chassis Warning for Rack-Mounting and Servicing

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.
- 

**Figure 12: Four Post Rack Mount Kit for Cisco Catalyst 9500X Series Switches**

This figure shows the four post rack mount kit for Cisco Catalyst 9500X Series Switches. You can order the optional brackets from your Cisco sales representative.

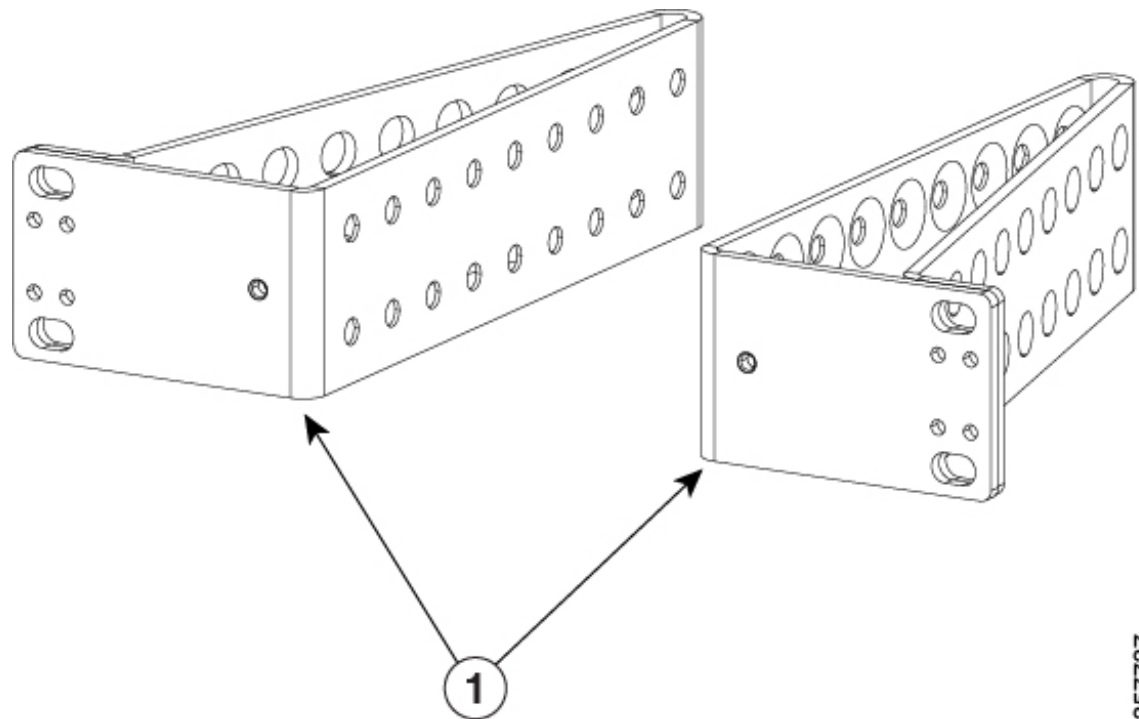


471183

1	Two 19-inch brackets	4	Eight number-10 Phillips pan-head 0.625" long screws
2	Extension rails and brackets for four-point mounting	5	24 M4.0 x 6mm Phillips flat-head screws
3	Eight number-12 Phillips pan-head 0.50" long screws	-	-

**Figure 13: 23-inch Rack Mount Kit for Cisco Catalyst 9500X Series Switches**

This figure shows the optional 23-inch rack mount kit for Cisco Catalyst 9500X Series Switches. You can order the kit from your Cisco sales representative.



357737

1	23-inch rack mount bracket
---	----------------------------

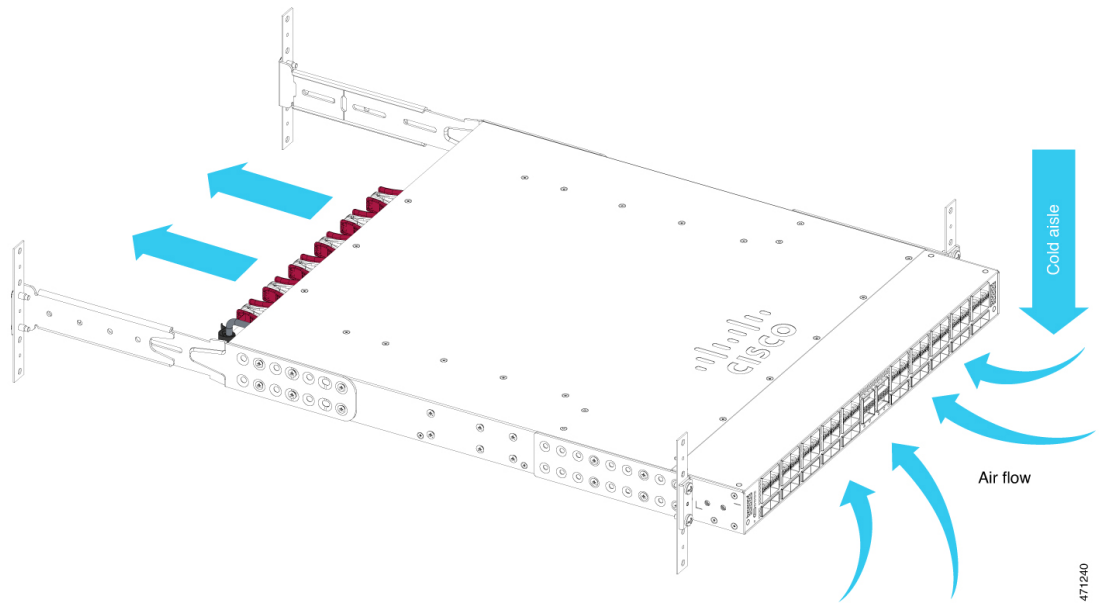
## Attaching the Rack-Mount Brackets

### Before you begin

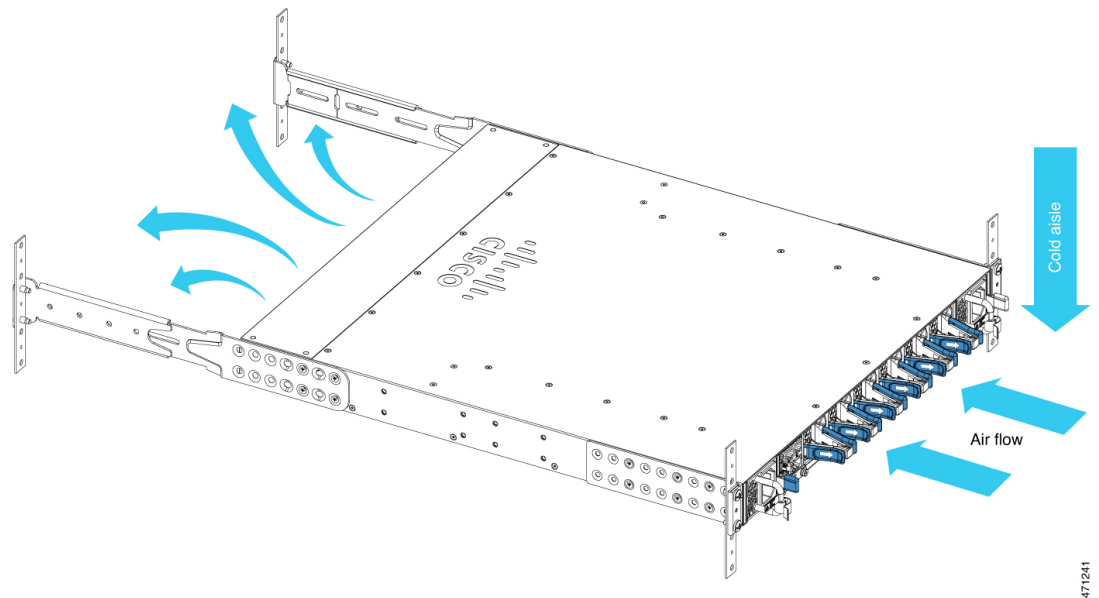
Determine which end of the switch should be located in the cold aisle of the site:

- If the switch supports front-to-back air flow (C9500X-FAN-1U-R fan module), position the switch such that ports are located in the cold aisle.





- If the switch supports back-to-front air flow (C9500X-FAN-1U-F fan module), position the switch such that the fan and power supply modules are located in the cold aisle.



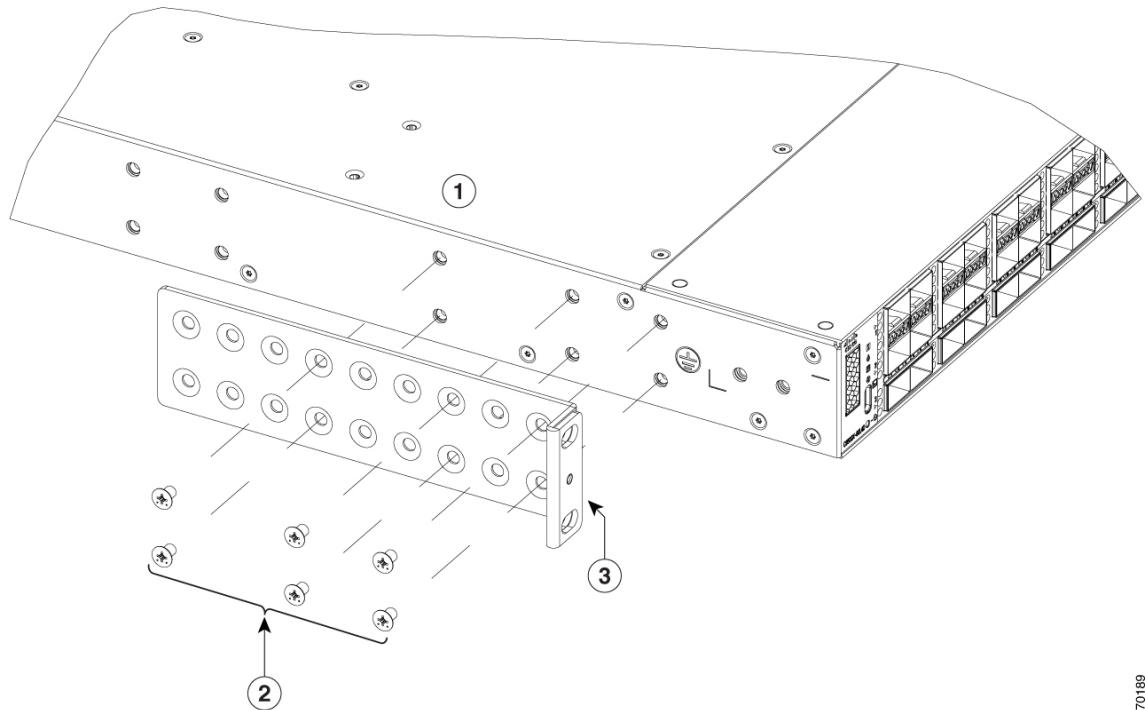
## Procedure

**Step 1** Attach the rack-mount brackets to the switch.

Use M4.0x6mm Phillips flat-head screws to attach the long side of the bracket to each side of the switch for the front, middle, or rear mounting positions.

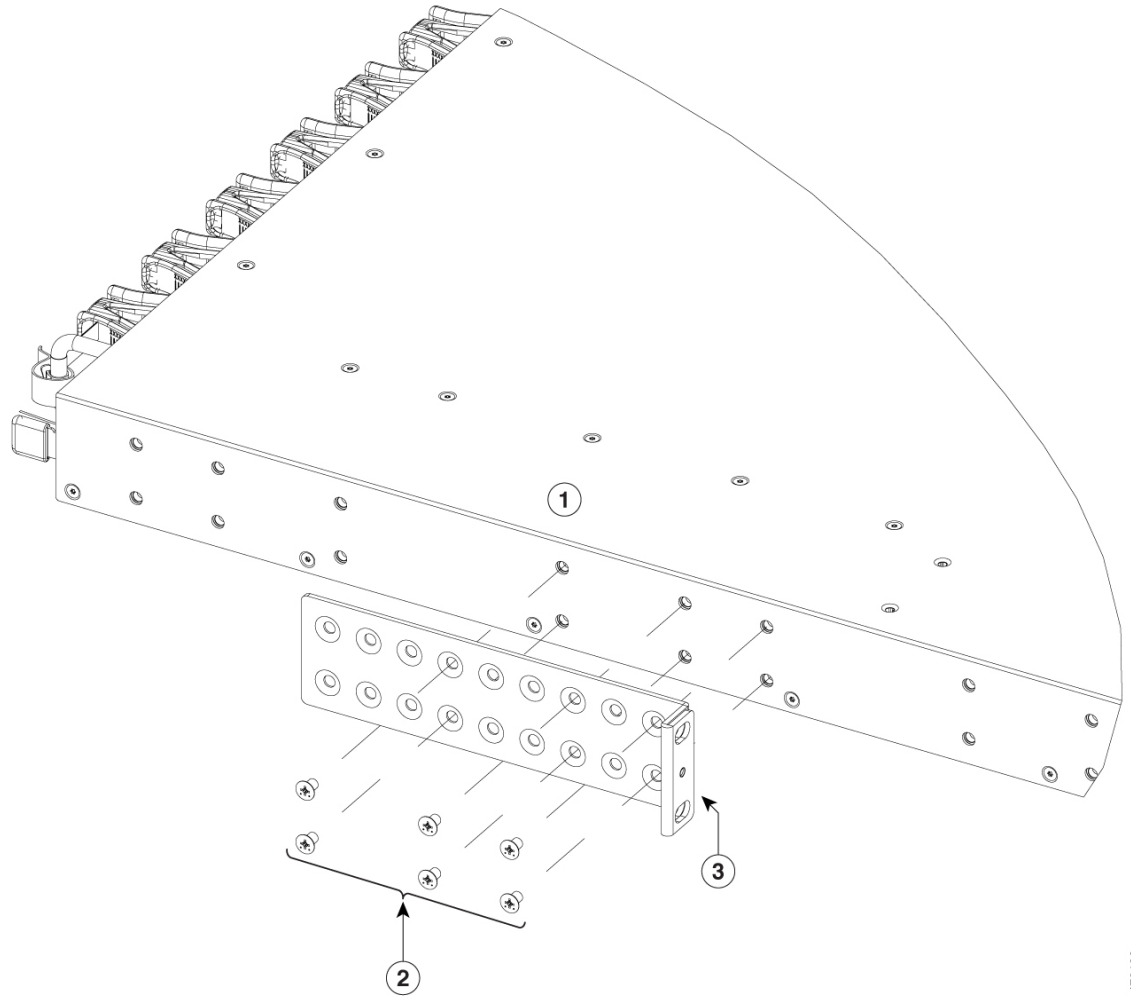
**Figure 14: Front Mounting position of Rack Mounting Brackets**

Cisco Catalyst 9500X Series Switches use 6 screws to install the bracket on one side of the switch.



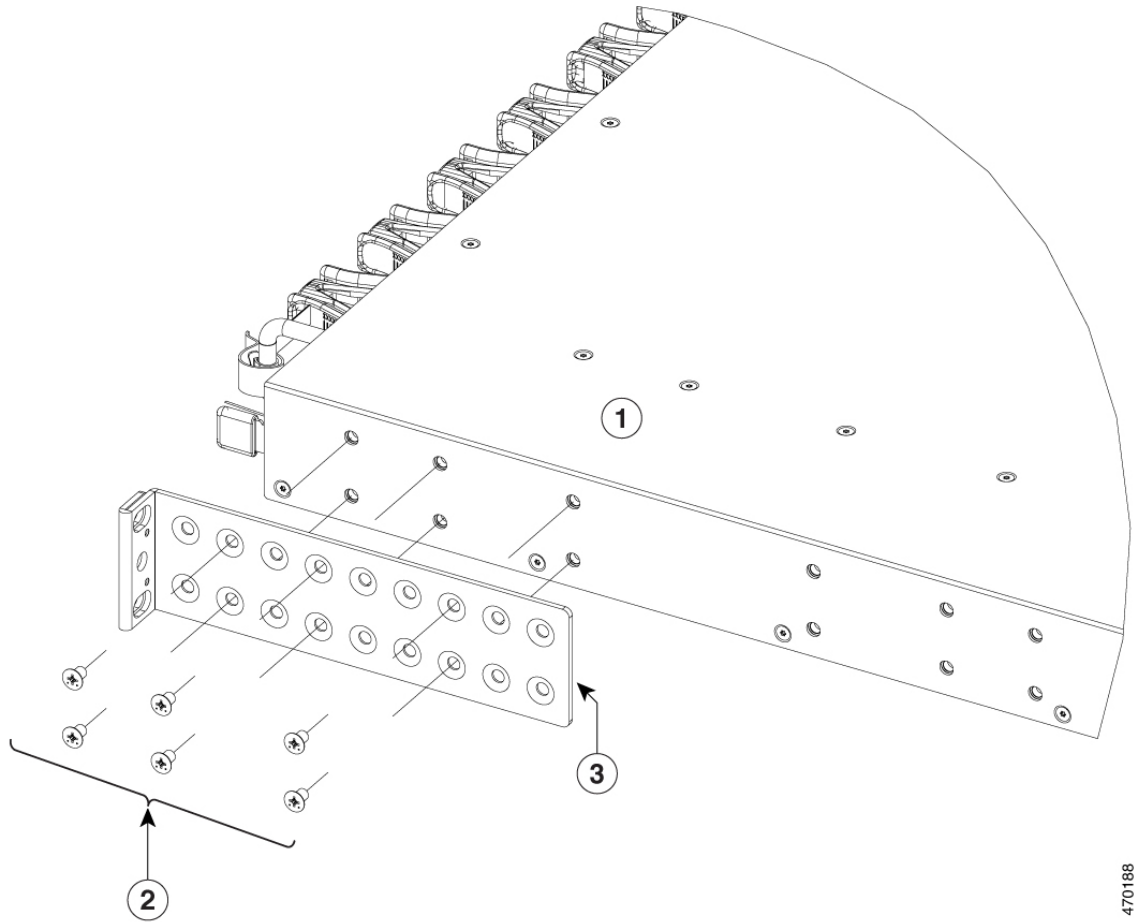
4770189

Figure 15: Middle Mounting position of Rack Mounting Brackets



470190

Figure 16: Rear Mounting position of Rack Mounting Brackets



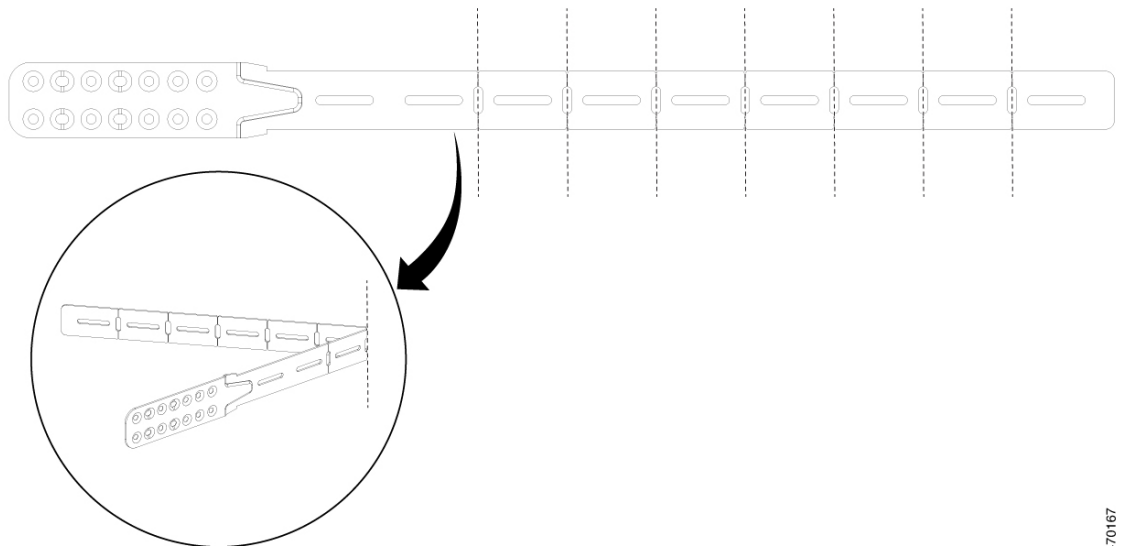
470188

1	Cisco Catalyst 9500X Series switch	3	19-inch mounting brackets
2	M4.0x6mm Phillips flat-head screws	-	-

**Step 2**

The extension rail that is provided may be longer than the required size. To trim the extension rail to the required length, bend the extension rail along the mark specified and cut it.

**Figure 17: Bend and Cut the Extension Rail to the Required Length**

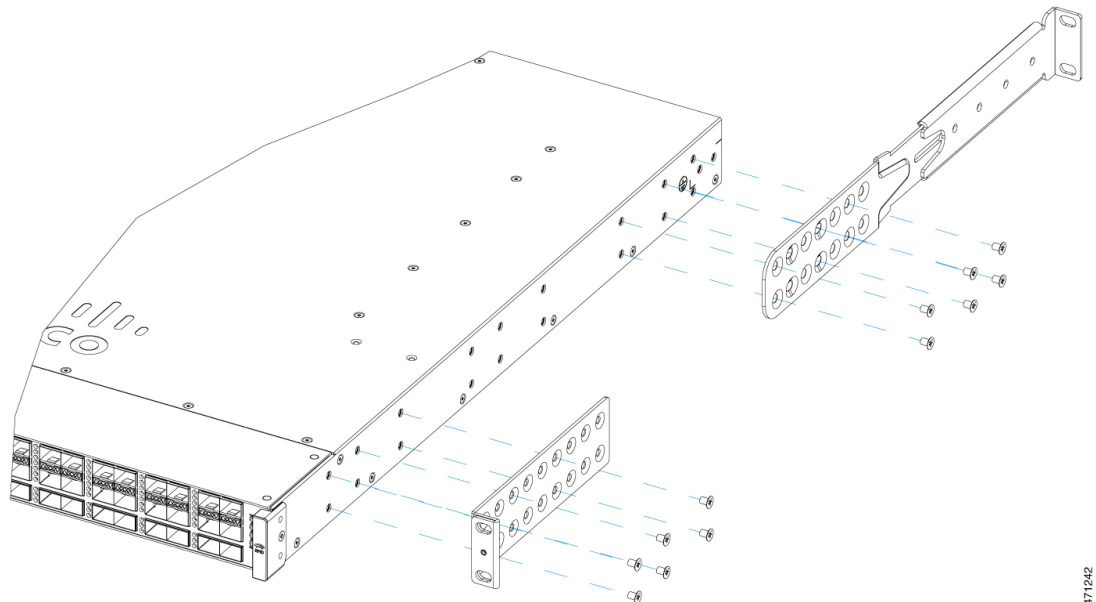


470167

- Step 3**
- a) If the switch ports are located in the cold aisle (front-to-back air flow), use the Phillips machine screws to attach the brackets and the extension rail to the switch.

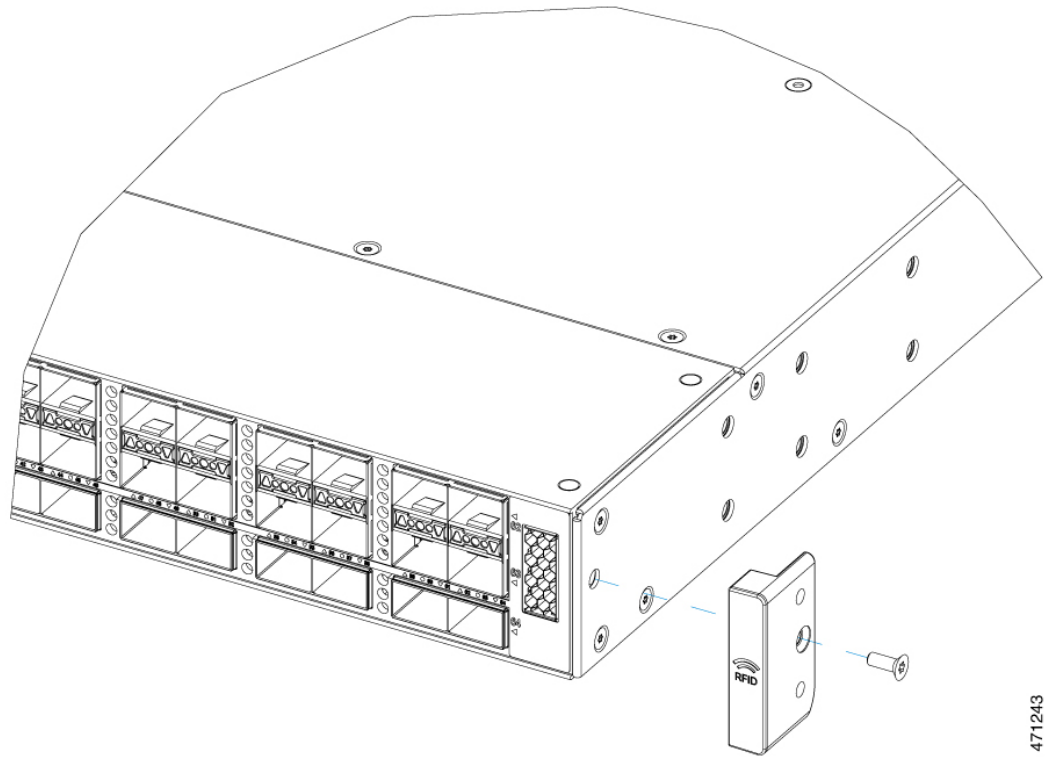
**Figure 18: Attaching the Extension Rail**

Use six screws to attach the extension rail on to one side of the switch.

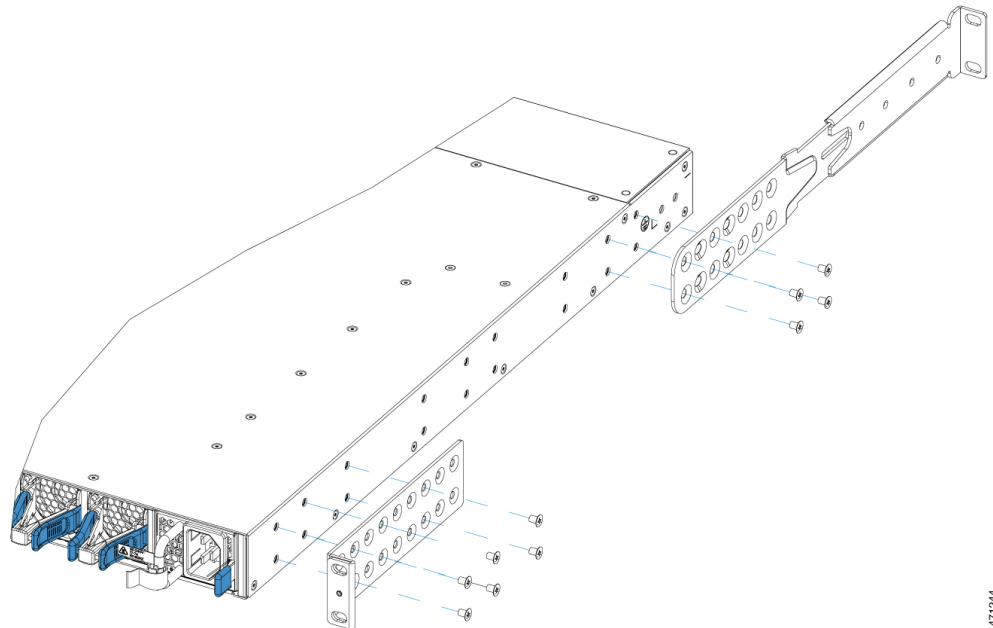


471242

- b) If the switch ports are located away from the cold aisle (back-to-front air flow):
  1. First disassemble the RFID as shown.



2. Use the Phillips machine screws to attach the brackets and the extension rail to the switch.

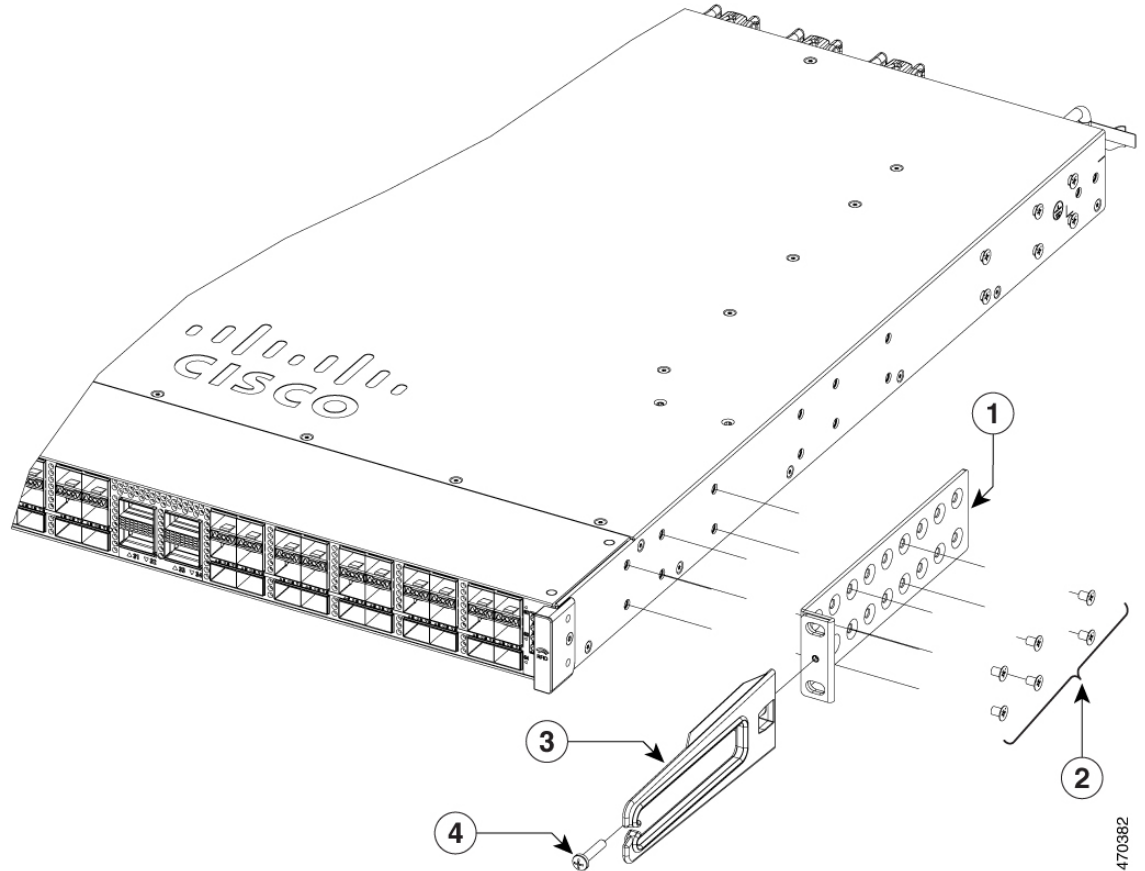


## Mounting the Switch in a Rack

### Procedure

**Step 1** Use the black Phillips machine screw to attach the cable guide to the left or right bracket.

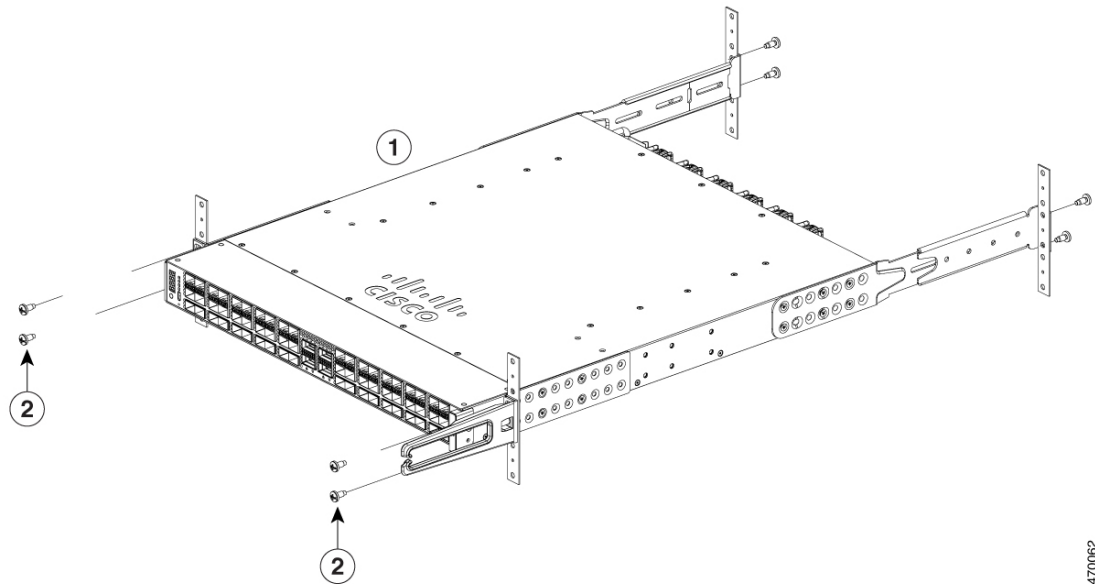
**Figure 19: Attaching the Cable Guide**



1	19-inch bracket	3	Cable guide
2	Phillips machine screws	4	M4.0x20mm Phillips pan-head screws (Black color)

**Step 2** Secure the switch to the rack rails using the Number-12 or number-10 Phillips machine screws provided with the accessory kit.

Figure 20: Mounting the Switch in a Rack



1	Cisco Catalyst 9500X Series switch front-mounting position	2	Number-12 or number-10 Phillips machine screws
---	--	---	--

## After Switch Installation

- Configure the switch using the Web User Interface. For more information, see "Configuring the Switch Using the Web User Interface" topic in the *Software Configuration Guide*.
- Connect the required devices to the switch ports.
- Turn on the power supply switches to power up the system. While powering up, the switch performs a series of bootup diagnostic tests.



**Note** The switch is designed to boot up in less than 30 minutes, provided that the neighboring devices are in fully operational state.

- Verify port connectivity after connecting devices to the switch ports. The LED turns green when the switch and the attached device have a link.





## CHAPTER 5

# Installing Field Replaceable Units

- [Installing a Power Supply](#) , on page 45
- [Installing a Fan Module](#), on page 54
- [Installing an SSD Module](#), on page 58

## Installing a Power Supply

### Power Supply Overview

The switch chassis has two slots in which you can install power supplies using any of the following combinations:

- Two AC, two DC or AC-DC power supplies
- One AC-input power supply or one DC-input power supply (leaving the blank cover on the other slot)

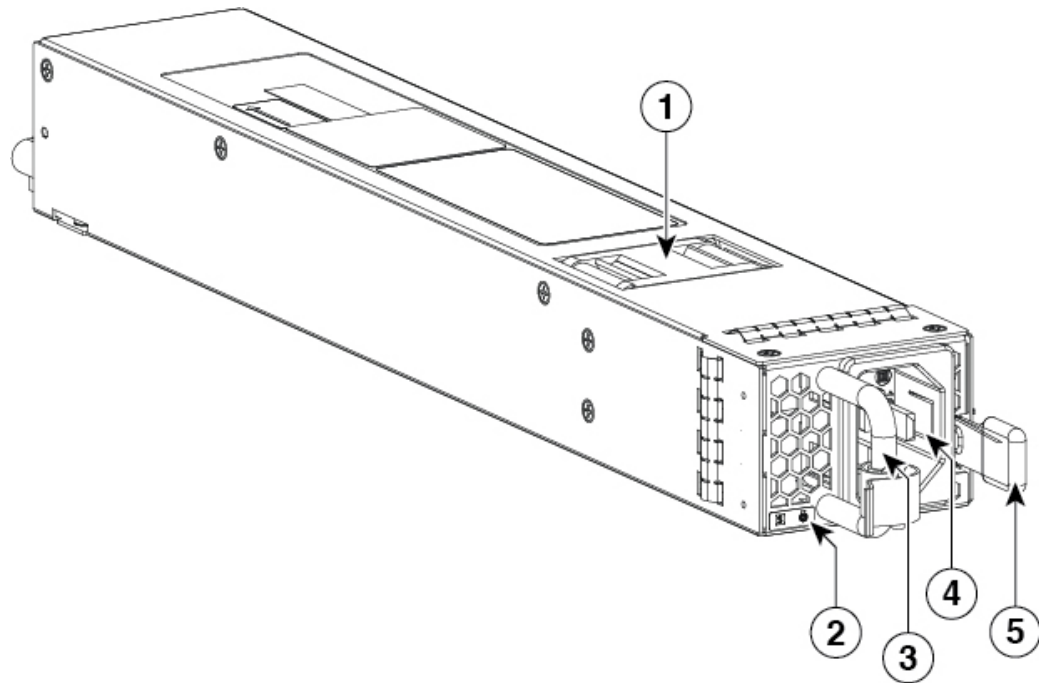


**Note** If you leave any power supply slots empty, you must ensure that the blank cover (Part Number PWR-C6-BLANK) is installed in that slot to maintain the designed airflow.

This table lists the power supply models. To understand about the power supply modules supported on different switch models, see [Power Supply Slots](#), on page 13.

Part Number	Description
C9K-PWR-1500WAC	1500W AC Power Supply
C9K-PWR-1500WDC	1500W DC Power Supply

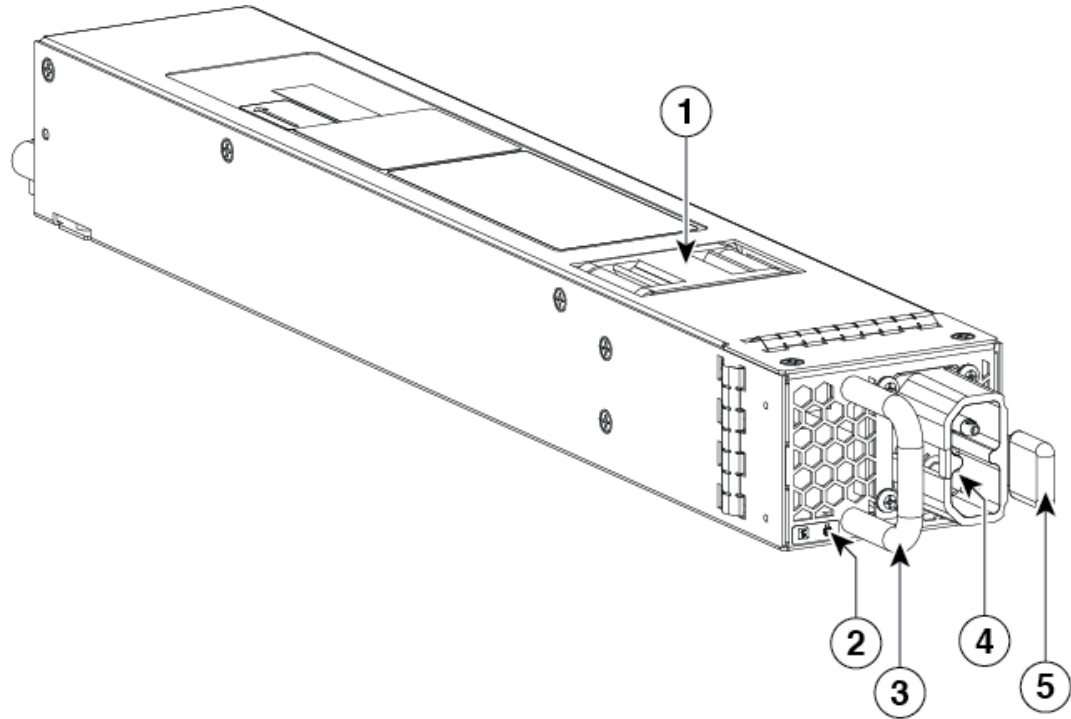
Figure 21: Cisco Catalyst 1500W AC Input Power Supply



357729

1	PSU fan	4	AC input connector
2	PSU LED	5	Release latch
3	Release handle	-	-

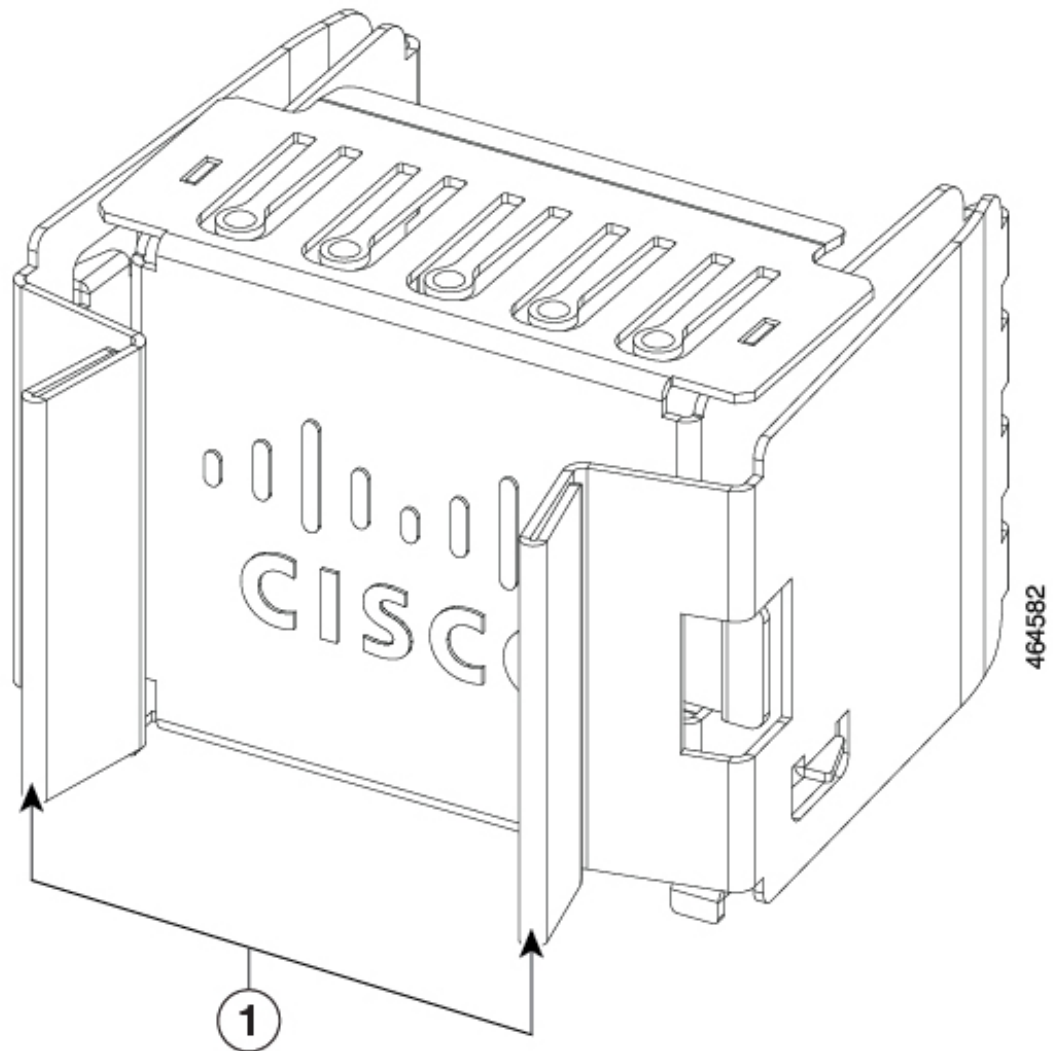
Figure 22: Cisco Catalyst 1500W DC Input Power Supply



357730

1	PSU fan	4	DC input connector
2	PSU LED	5	Release latch
3	Release handle	-	-

Figure 23: Power Supply Slot Cover for Cisco Catalyst 9500X Series Switches



1	Release handles
---	-----------------

The power supplies can work together in Redundant Mode, in which each power supply operates at approximately 50 percent of its capacity, no greater than 60 percent and no less than 40 percent. If one power supply fails, the other power supply can provide power for the entire system on its own. This is the default and recommended mode.

#### Power supply modules LED

The AC and DC power supply modules have the following LEDs:

- Green indicating the power status
- Red indicating the power supply failure

- Amber indicating a warning

**Table 10: LEDs on the AC/DC power supply modules**

LED	Status	Description
Unlit	Off	No input power.
Green	Blinking	AC is present; 3.3 VSB (Voltage Standby) is on. Power supply unit is off.
	Solid	Power supply is functioning normally.
Amber	Blinking	Warning detected. Power supply continues to operate. High temperature, high power and slow fan conditions.
	Solid	Power supply failure. This may be due to excessive voltage, excessive current, excessive temperature, output ORING FET fault and fan failure.

## Installation Guidelines

- The switch chassis must be installed in a cabinet or rack that is secured to the data center.
- Remove the power supply from its shipping container and remove any packaging.
- You need the following additional tools and equipment:
  - Nut driver attachment for number 1 Phillips-head screwdriver or ratchet wrench with torque capability (used only for DC-input power supplies).
  - Grounding wire — Size this wire to meet local and national installation requirements. For U.S. installations, you must use an 8-14 AWG copper conductor for AC power supply systems. For installations outside the U.S., consult your local and national electrical codes. The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.
- The chassis is connected to an earth ground.
- You have receptacles for the power sources within reach of the power supply cables.
- If you are connecting to a DC power, check that you are using power cables to connect to the power supply. The wire size applies to the negative [-], and positive [+] cables that connect to negative and positive apertures on the connector. You have to procure the power cable.
- If you are installing more than one DC-input power supply, each must be protected by a dedicated circuit breaker or a fuse that is sized according to the power supply input rating and the local or national electrical code requirements.
- The power sources are rated as follows:
  - For North American AC-input installations—16A with 110V circuits.

- For North American DC-input installations—(–48 VDC nominal at 37 A in North America (operating range: –40.5 to –56 VDC).
- For international installations—Size the circuits by local and national standards.
- The power supply is already inserted into the chassis.

**Caution**

Ensure that the power source is OFF. As an added precaution, place the appropriate safety flag and lockout devices at the source power circuit breaker, or place a piece of adhesive tape over the circuit breaker handle to prevent accidental power restoration while you are working on the circuit.

**Warning****Statement 1003—DC Power Disconnection**

To reduce risk of electric shock or personal injury, disconnect DC power before removing or replacing components or performing upgrades.

## Installing Power Supply

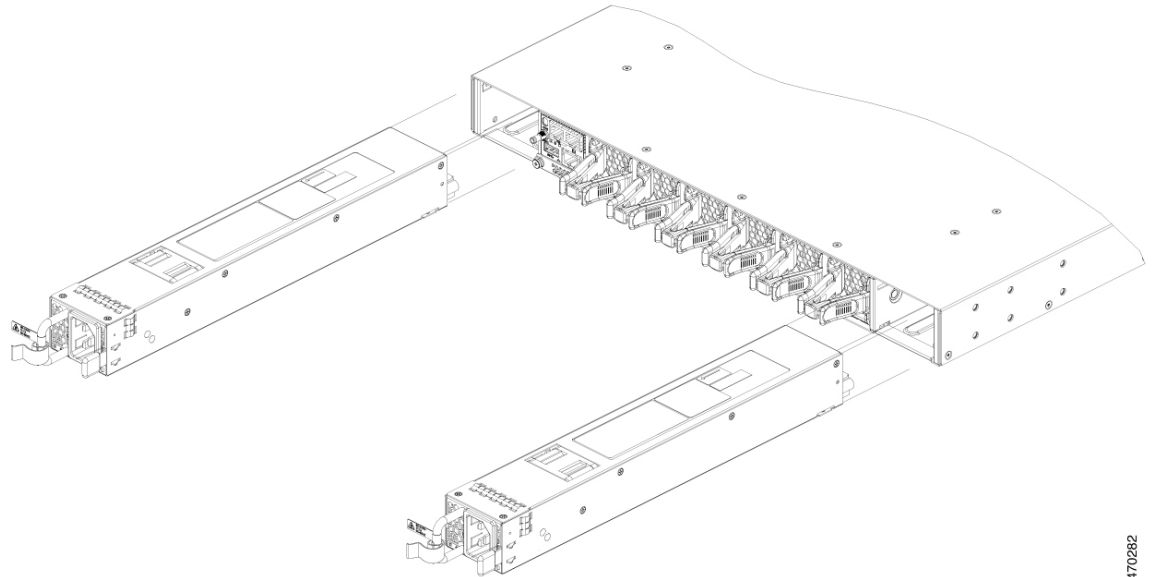
### Inserting the Power Supply

To insert the power supply into the chassis, follow these steps:

#### Procedure

- 
- Step 1** Remove the blank cover and store it for future use.
  - Step 2** Verify that the power supply is not connected to any power sources.
  - Step 3** Hold the handle on the power supply with one hand and position the power supply with its back end at the open power supply bay. See the figure for an example (AC power supply is shown as an example, DC power supply can be installed in the same way).
  - Step 4** Slide the unit all the way into the power supply bay until the release latch on the front of the power supply clicks and prevents you from moving the power supply in or out of the chassis.
- Note** Ensure that the power supply is inserted into the slot in the right direction. If you have inserted the power supply in the reverse direction, the power supply will not be seated correctly and it projects out of the slot.

Figure 24: Installing the Power Supply



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## Connecting to the Power Source

Each power cable is shipped with mating connectors with one of the connectors on the power socket and the other connector on the front panel of the power supply. You follow the same steps to install the AC-input and DC-input power supplies, but you must ground them differently.

- AC-input power supply—It is automatically grounded when you connect its power cable to the power supply and the power source.
- DC-input power supply—You do not connect the power supply directly to the earth ground.

You use one power cord for each power supply to connect the power supply to its power source.

## Connecting to an AC Power Source

To connect to a power source, follow these steps:

### Procedure

- 
- Step 1** Prior to connecting the power supply to a power source, ensure that the chassis is properly grounded.
- Step 2** Plug the power cable into the power supply.
- Step 3** Plug the other end of the power cable into a power source supplied by the data center.
- Note** When using redundant mode, connect each power supply to a separate power source.
- Step 4** Verify that the power supply is receiving power by checking that the LED is on and is amber or red. For more information about the power supply LEDs and the conditions that they indicate, see [Power Supply LEDs](#).

When you first activate the power supply, you can verify the functionality of the LED by checking that LED turns on for a couple of seconds. If the LED is flashing amber or red, check the power connections on the power supply and the power source.

## Connecting to a DC Power Source

To connect the DC power supply directly to one or two DC power sources, follow these steps:



### Warning Statement 1003—DC Power Disconnection

To reduce risk of electric shock or personal injury, disconnect DC power before removing or replacing components or performing upgrades.

### Procedure

- Step 1** Prior to connecting the power supply to a power source, ensure that the chassis is properly grounded.
- Step 2** Plug the DC power cable into the DC power supply.
- Step 3** Turn off the power at the circuit breakers for the portions of the DC grid power that you are connecting to and verify that all of the LEDs on the DC grid power supplies are off.
- Step 4** Install the two cables from the DC power cable to a DC power source as follows:
  - a. If the unconnected end of each power cable is not stripped off of its insulation for the last 0.75 inches (19 mm), use wire strippers to remove that amount of insulation.
  - b. Attach the negative cables to the negative terminals of a DC power source, and attach the positive cables to the positive terminals of the same power source.
- Step 5** Verify that the power supply is receiving power by checking that the LED is on and is amber or red. For more information about the power supply LEDs and the conditions that they indicate, see [Power Supply LEDs](#).  
When you first activate the power supply, you can verify the functionality of the LED by checking that LED turns on for a couple of seconds. If the LED is flashing amber or red, check the power connections on the power supply and the power source.

## Removing Power Supplies

### Procedure

- Step 1** Turn off the power to the power supply that you are removing, as follows:  
If you are removing a DC-input power supply, ensure that the power is turned off at the power source by turning off the power for that circuit.



**Step 2** Detach the power and ground cables, as follows:

- For the AC-input power supply, unplug the power cables that are attached to the power supply and the power source.
- For the DC-input power supply, remove the power cables from the power supply and the power source.

**Step 3** Remove the power supply from the chassis, as follows:

- a) Press the ejector latch on the right of the power supply.
- b) Pull the power supply partially out of the slot by its handle.
- c) Pull the power supply fully from the slot.

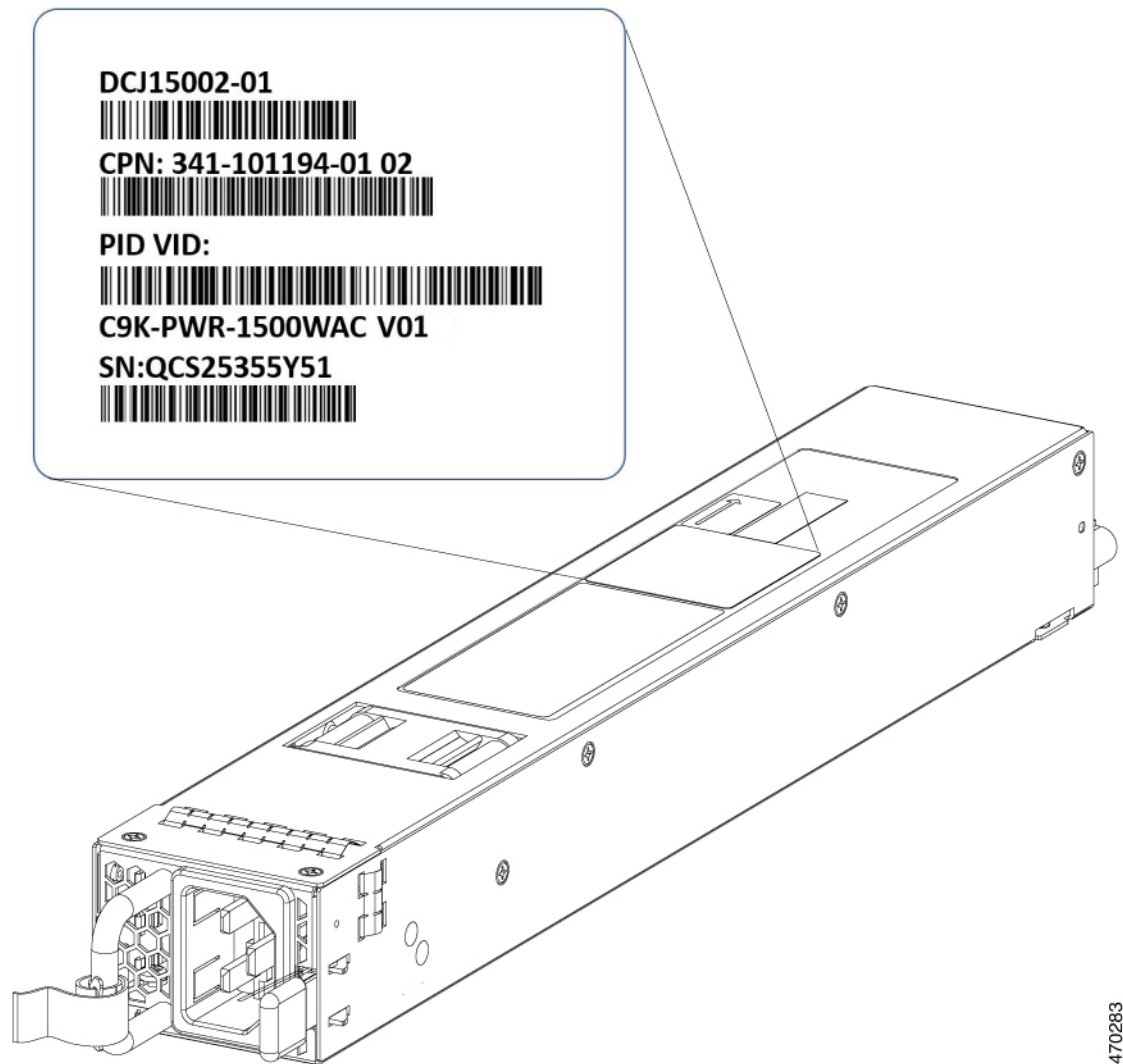
**Caution** If you intend to operate the switch without installing another power supply in the empty slot, then you must reinstall the blank cover over the empty power supply slot to ensure proper air flow in the system and for safety reasons.

---

## Finding the Serial Number

If you contact Cisco Technical Assistance, you need to know the serial number. These figures show where the serial number is located. You can also use the **show inventory EXEC** command to see the serial number.

Figure 25: Serial Number on the Power Supply



## Installing a Fan Module

### Fan Module Overview

Six individual fan modules are available. The switch can operate with five operational fans and one nonfunctional fan. Any failed fan should be replaced as soon as possible to avoid service interruption due to a second fan fault.

For the switch to boot-up, ensure the following conditions are met.

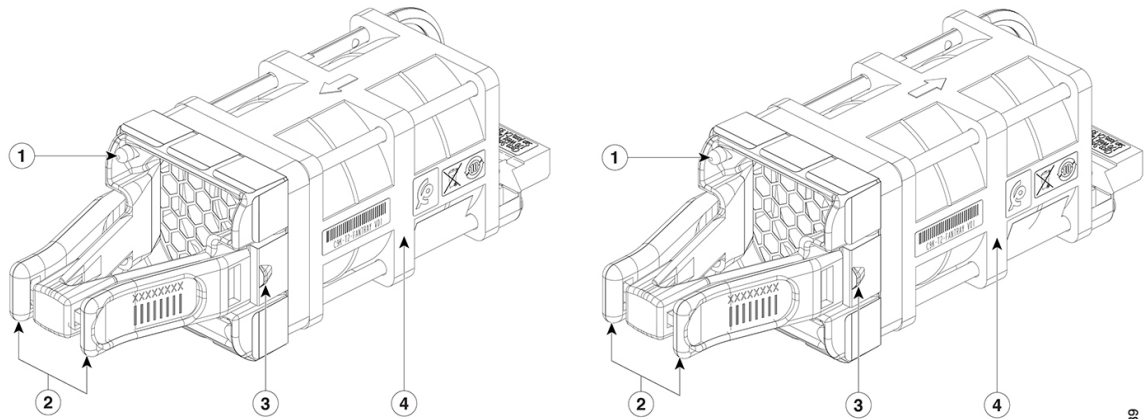
- the switches using C9500X-FAN-1U-R or C9500X-FAN-1U-F modules must at a minimum have 5 fans operating normally

If the switch fails to meet the minimum number of required fans, the switch shuts down automatically to prevent the system from overheating.

Part Number	Supported Switches	Description
C9500X-FAN-1U-R	C9500X-28C8D	<ul style="list-style-type: none"> <li>• Each switch contains six field-replaceable fans with variable-speed operating in N+1 redundancy mode.</li> <li>• Provides support for front-to-back airflow and back-to-front airflow fans. By default, the switch provides front-to-back airflow fan.</li> </ul> <p>Note the following usage guidelines:</p> <ul style="list-style-type: none"> <li>• -R in the part number indicates reverse airflow (front-to-back) and -F indicates forward airflow (back-to-front).</li> <li>• All the fan modules used in the switch must have the same airflow direction.</li> <li>• To change the airflow direction in the unit, ensure that you change all the fan modules to the same type of airflow support. For example, to change to forward airflow, replace all the six fans with C9500X-FAN-1U-F. After replacing all the fan modules, power cycle the unit manually.</li> </ul>
C9500X-FAN-1U-F	C9500X-60L4D	

**C9500X-FAN-1U-R or C9500X-FAN-1U-F**

*Figure 26: Fan Tray Unit with Dual-Stacked Fans*



464539

1	Fan LED	3	Fan assembly retention latch
2	Fan assembly levers C9500X-FAN-1U-R has a red-colored lever C9500X-FAN-1U-F has a blue-colored lever	4	Fan

## Installation Guidelines

Observe these guidelines when removing or installing a fan module:

- Do not force the fan module into the slot. This can damage the pins on the switch if they are not aligned with the module.
- A fan module that is only partially connected to the switch can disrupt the system operation.
- The switch supports hot swapping of the fan module. You can remove and replace the module without interrupting normal switch operation.
- All fan modules should be of the same model (C9500X-FAN-1U-R or C9500X-FAN-1U-F). Installation of mixed type of fan modules is not supported.

## Installing a Fan Module

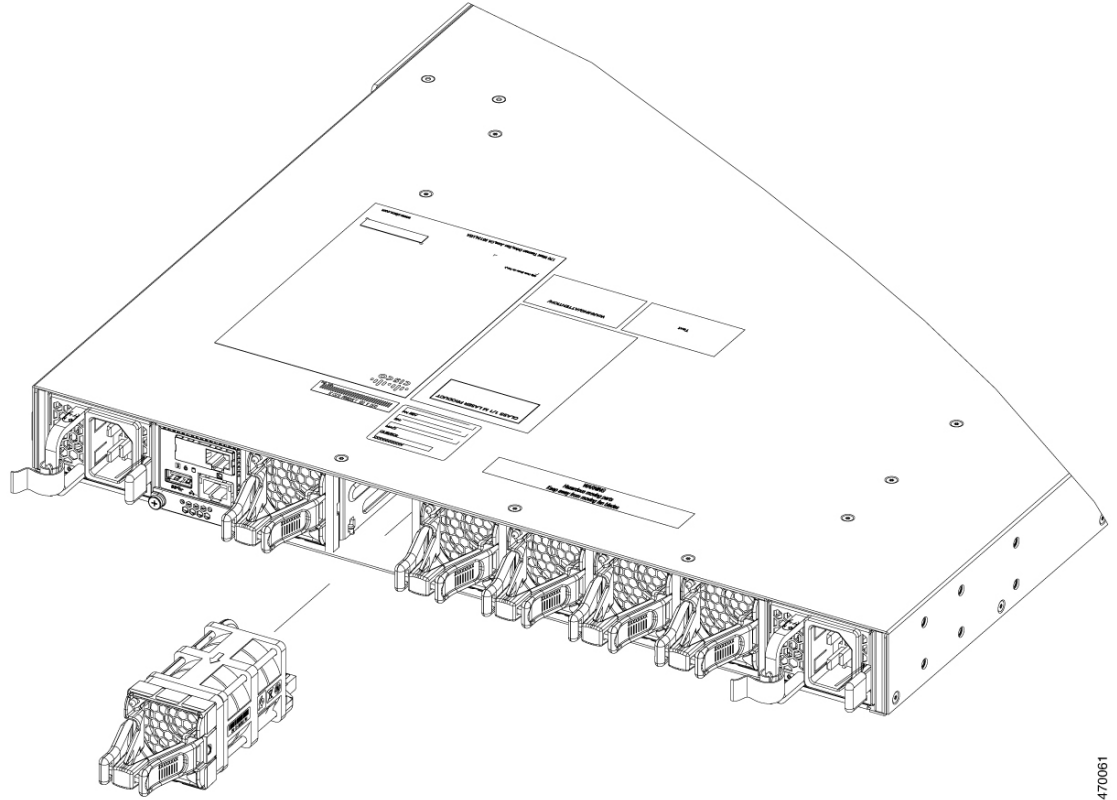
### Procedure

- 
- Step 1** Pinch the fan module release handle and slide the module out.

**Caution** You should replace the fan module within 5 minutes to avoid overheating the switch.

**Step 2** Install the fan module in the fan slot, and firmly push it into the slot, applying pressure to the end of the module, not the extraction handles. When correctly inserted, the fan module is flush with the switch rear panel. When the fan is operating, a green LED is on in the top left corner of the fan.

**Figure 27: Installing the Fan Module on Cisco Catalyst 9500X Series Switch**

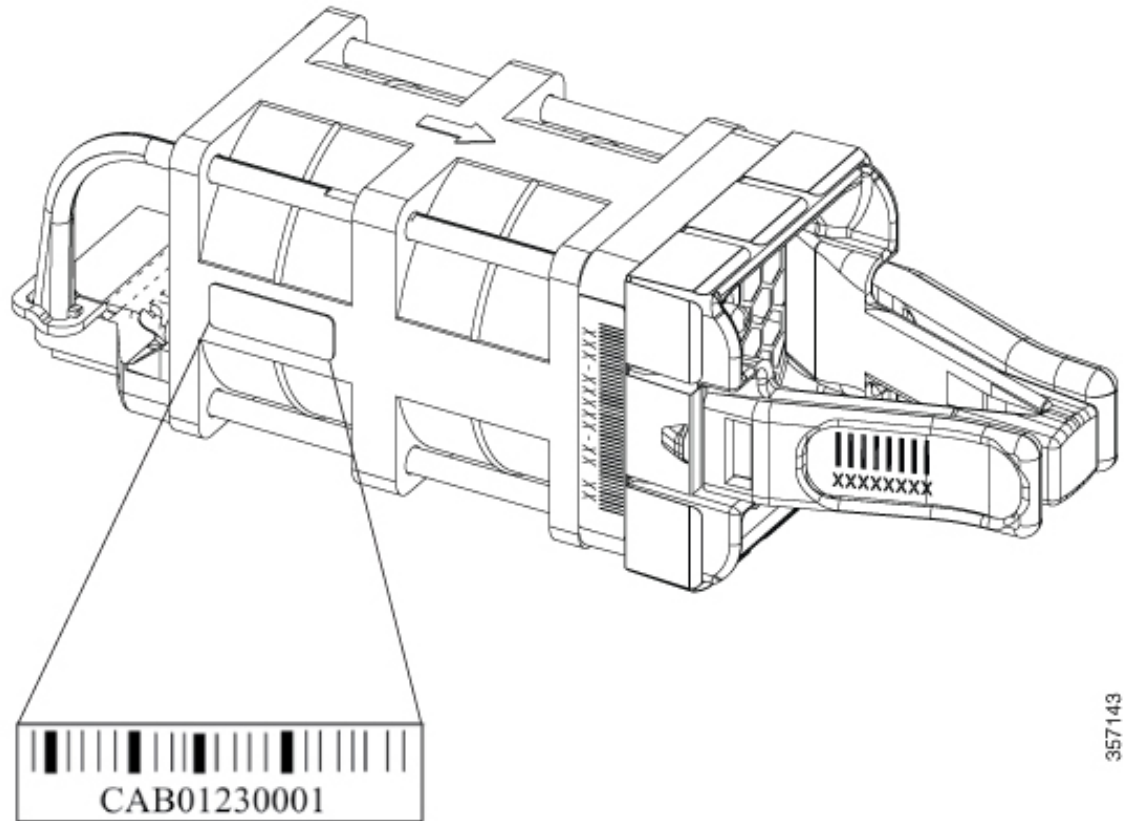


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## Finding the Fan Module Serial Number

If you contact Cisco Technical Assistance regarding a fan module, you need to know the fan module serial number. See the following illustration to find the serial number.

Figure 28: Fan Module Serial Number



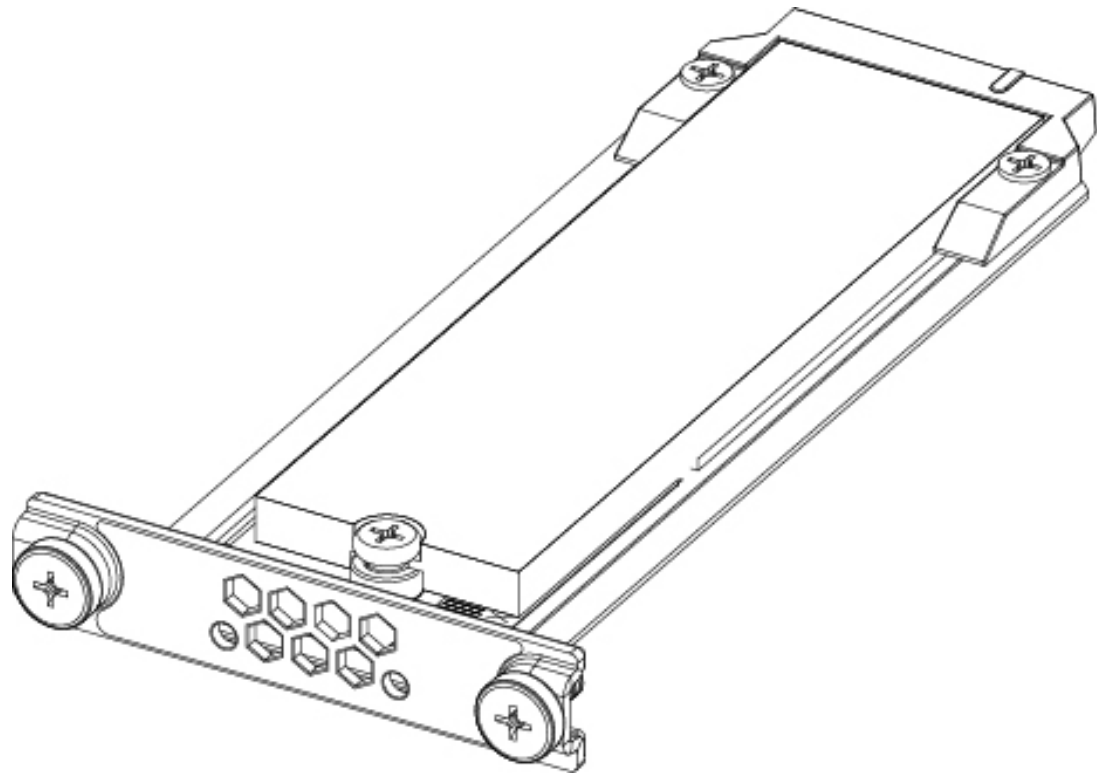
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## Installing an SSD Module

### SATA SSD Module Overview

SATA SSD module is available as a field-replaceable unit (FRU). The SSD module does not support hot-swapping. Power off the switch before removing or installing an SSD module.

Figure 29: SSD Supported on Cisco Catalyst 9500X Series Switches



357736

The following table lists the SSD modules supported on Cisco Catalyst 9500X Series Switches.

SSD Module	Description
C9K-F3-SSD-240GB=	Cisco pluggable SSD storage – 240 GB
C9K-F3-SSD-480GB=	Cisco pluggable SSD storage – 480 GB
C9K-F3-SSD-960GB=	Cisco pluggable SSD storage – 960 GB

## Installing an SSD Module

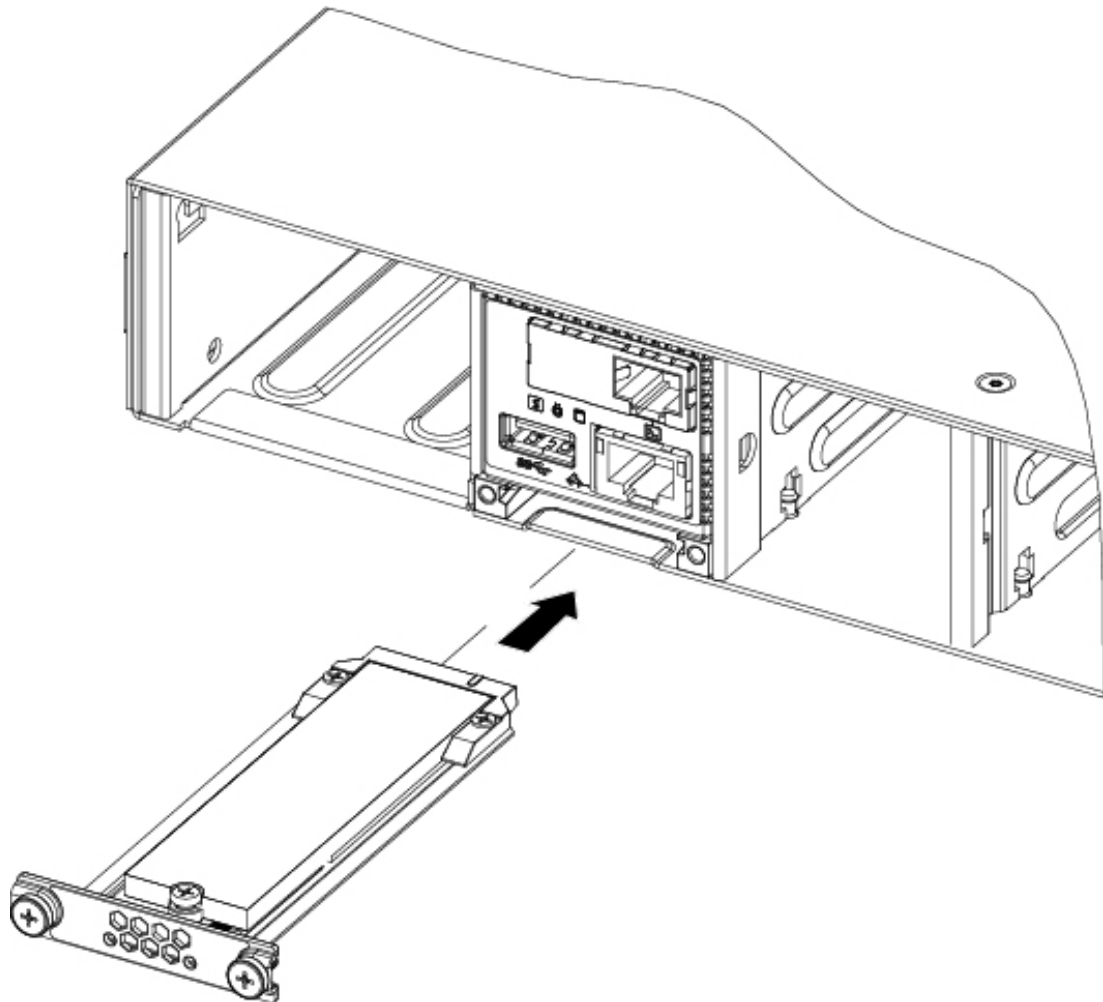
### Before you begin

Ensure that the switch is powered off.

### Procedure

- 
- Step 1** Remove the blank cover on the SSD module slot on the switch and store it for future use.
  - Step 2** Insert the SSD module into the USB 3.0 SSD module slot, and firmly push it into the slot.

Figure 30: Installing an SSD Module on a Cisco Catalyst 9500X Series Switch



357735

- Step 3** Secure the SSD module to the chassis using the two screws provided.

## Removing an SSD Module

### Before you begin

Ensure that the switch is powered off.

### Procedure

- Step 1** Loosen the two screws on the SSD module.
- Step 2** Remove the SSD module from the module slot and insert the blank slot cover.



If you are replacing the SSD module, insert the new module into the slot. For more information, see [Installing an SSD Module, on page 59](#).

---





## CHAPTER 6

# Troubleshooting

---

- [Getting Started, on page 63](#)
- [Solving Problems at the System Component Level, on page 63](#)
- [Identifying Startup Problems, on page 64](#)
- [Troubleshooting the Power Supply, on page 64](#)
- [Troubleshooting the Fan Tray , on page 65](#)
- [Status LED Indicators, on page 65](#)
- [Contacting Cisco Customer Service, on page 65](#)
- [Finding the Serial Number, on page 66](#)

## Getting Started

When the initial system startup is complete, verify the following:

- Power supplies are supplying power to the system.
- The fan tray assembly is operating.
- System software boots successfully.

If one or more of the above conditions are not met, use the procedures described in this chapter to isolate and, if possible, resolve the problem. If all of the above conditions are met, and the hardware installation is complete, refer to your software release notes for hardware support information and software caveats.

## Solving Problems at the System Component Level

The key to success when troubleshooting the system is to isolate the problem to a specific system component. The first step is to compare what the system *is doing* to what it *should be doing*. Because a startup problem can usually be attributed to a single component, it is more efficient to isolate the problem to a subsystem rather than troubleshoot each separate component in the system.

The switch consists of these subsystems:

- Power supplies
- Fan tray assembly

The chassis fan tray assembly should operate whenever system power is on. You should see the FAN LED turn green and hear the fan tray assembly operating. A red or amber FAN LED indicates that one or more fans in the fan tray assembly is not operating. You should immediately contact a Customer Service representative if the fan tray assembly is not functioning properly. There are no installation adjustments that you can make if the fan tray assembly does not function properly at initial startup.

## Identifying Startup Problems

LEDs indicate all system states in the startup sequence. By checking the LEDs, you can determine when and where the system failed in the startup sequence.

### Procedure

- 
- Step 1** Turn on the power supplies. You should immediately hear the system fan tray assembly begin to operate.
- Step 2** If the startup information and system banner do not display at startup, verify that the terminal is set correctly and that it is connected properly to the console port.
- 

## Troubleshooting the Power Supply

If the Power Supply LED does not light after you turn on the power switch, follow these steps to isolate a power subsystem problem:

### Procedure

- 
- Step 1** Verify that the Power Supply LED on the power supply is green.
- If the Power Supply LED is green, the AC or DC source is good and the power supply is functional.
  - If the Power Supply LED remains off, there might be a problem with the AC source, the DC source, or the power cable.
  - Turn off the power to the switch, connect the power cord to another power source if one is available, and turn on the power.
  - If the Power Supply LED is green, the problem is the first power source.
  - If the Power Supply LED fails to light after you connect the power supply to a new power source, replace the power cord, and turn on the switch.
  - If the Power Supply LED then goes on, return the first power cord for replacement.

If this unit has more than one power cord, repeat Step 1 for each power supply.

If the Power Supply LED still fails to light when the switch is connected to a different power source with a new power cord, the power supply is probably faulty.

If a second power supply is available, install it in the second power supply bay, and contact a customer service representative for further instructions.

**Step 2** If you have a second power supply, repeat Step 1 for this power supply.

---

#### What to do next

If you are unable to resolve the problem or if you determine that either a power supply or backplane connector is faulty, see [Contacting Cisco Customer Service, on page 65](#).

## Troubleshooting the Fan Tray

To isolate a fan tray problem, follow these steps:

### Procedure

---

**Step 1** Verify that the FAN LED on the fan tray is green.

If the FAN LED is not green, see [Fan LED, on page 76](#) to determine whether or not the power subsystem is functioning properly.

**Step 2** Check to determine if the FAN LED is red or amber. If the FAN LED is red, one or more fans' tachometer faults have exceeded the maximum limit. If the FAN LED is amber, one or more fans have encountered tachometer faults.

Do the following:

- To ensure that the fan tray is seated properly, loosen the captive installation screws, remove the fan tray, and reinstall it.
  - Tighten all captive installation screws, and then restart the system.
  - If the FAN LED is still red or amber, the system detects an individual fan failure. Contact a customer service representative for instructions.
- 

## Status LED Indicators

Refer to "System LED" section in the "Product Overview" chapter. More details will be added here later.

## Contacting Cisco Customer Service

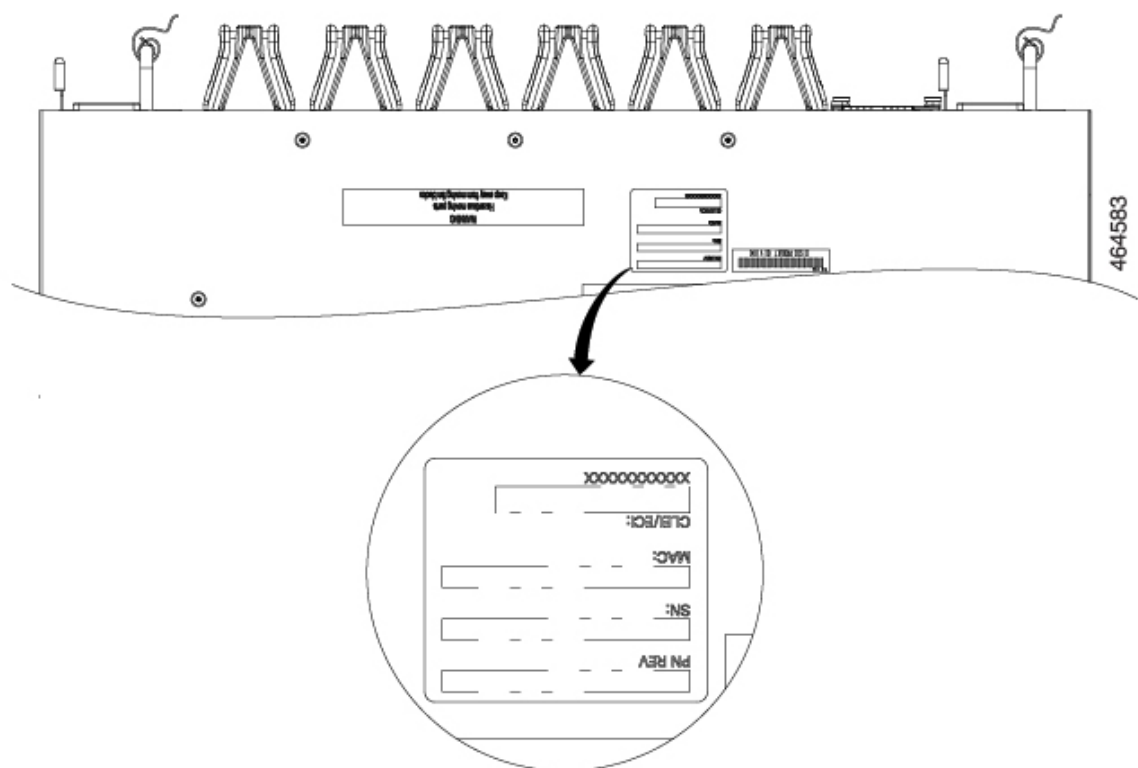
If you are unable to solve a startup problem after using the troubleshooting suggestions in this chapter, contact a Cisco customer service representative for assistance and additional instructions. Before you call, have the following information ready to help your service provider assist you as quickly as possible:

- Date on which you received the switch
- Chassis serial number
- Type of software and release number
- Maintenance agreement or warranty information
- Brief description of the problem
- Brief explanation of the steps you have already taken to isolate and resolve the problem

## Finding the Serial Number

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

*Figure 31: Serial Number Location Cisco Catalyst 9500X Series Switches*





# APPENDIX **A**

## Technical Specifications

- [Technical Specifications](#), on page 67
- [AC Power Cord Specifications](#), on page 68
- [DC Power Cable Specifications](#), on page 72

## Technical Specifications

This table describes the environmental specifications.

**Table 11: Environmental Specifications for the Switch**

Environmental Ranges	
Operating temperature	<ul style="list-style-type: none"> <li>• 32°F to 104°F (0 to 40°C) for 9500X switches with C9500X-FAN-1U-R<sup>2</sup> fans</li> <li>• -41°F to 95°F (-5°C to 35°C) for 9500X switches with C9500X-FAN-1U-F<sup>3</sup> fans</li> </ul>
Storage temperature	<ul style="list-style-type: none"> <li>• -40°F to 158° F (-40°C to 70°C)</li> </ul>
Relative humidity	<ul style="list-style-type: none"> <li>• Operating : 5 to 90% (noncondensing)</li> <li>• Non-Operating : 5% to 95% (noncondensing)</li> </ul>
Operating altitude	Up to 6000 ft (1800 m)
Storage altitude	Up to 15,000 ft (4500 m)

<sup>2</sup> Front-to-back airflow

<sup>3</sup> Back-to-front airflow

**Table 12: Acoustic Measurements for the Switches**

Switch Model	Sound Power Level
C9500X-28C8D with C9500X-FAN-1U-R <sup>4</sup>	No greater than 68.7 L <sub>WA</sub> d dB

Switch Model	Sound Power Level
C9500X-28C8D with C9500X-FAN-1U-F <sup>5</sup>	No greater than 69.9 L <sub>WAd</sub> dB
C9500X-60L4D with C9500X-FAN-1U-R <sup>6</sup>	No greater than 74.1 L <sub>WAd</sub> dB
C9500X-60L4D with C9500X-FAN-1U-F <sup>7</sup>	No greater than 78 L <sub>WAd</sub> dB

<sup>4</sup> Front-to-back airflow

<sup>5</sup> Back-to-front airflow

<sup>6</sup> Front-to-back airflow

<sup>7</sup> Back-to-front airflow

This table describes the physical specifications.

**Table 13: Physical Specifications for the Switch**

Physical Specifications		
Dimensions (H x W x D)	1.73 x 17.5 x 21.8 in. (4.4 x 44.5 x 55.4 cm)	C9500X-28C8D
	1.73 x 17.5 x 21.8 in. (4.4 x 44.5 x 55.4 cm)	C9500X-60L4D
Rack units (RU)	1 RU	
Chassis with 2 power supplies and built-in fan	29.27 lbs (13.28 kg)	C9500X-28C8D
	28.0428 lbs (12.72 kg)	C9500X-60L4D

This table describes the power requirements.

**Table 14: Power Requirements**

Power Requirements		
Input Voltage	90 to 264 VAC	C9500X-60L4D
		C9500X-28C8D

For power supply specifications, refer the [Cisco Catalyst 9500 Series Switches Data Sheet](#).

## AC Power Cord Specifications

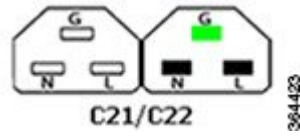
The following table lists the specifications for the AC power cords that are available for the AC-input power supplies. The table also includes references to power cord illustrations.





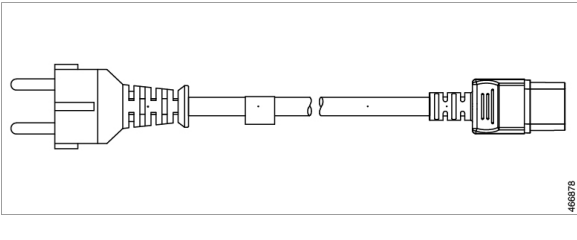
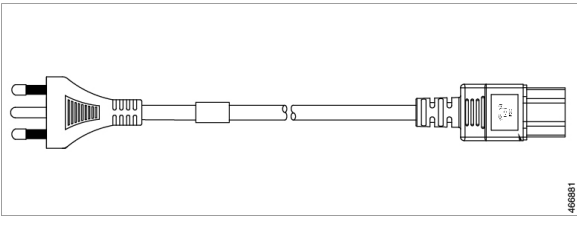
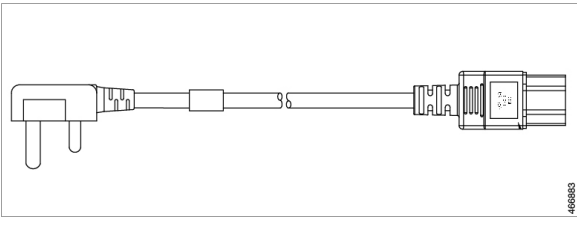
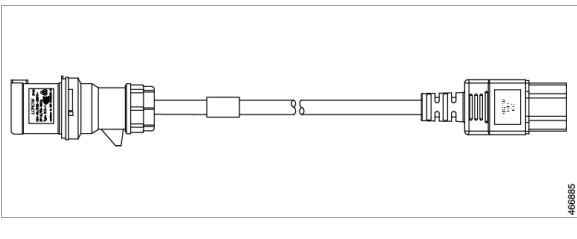
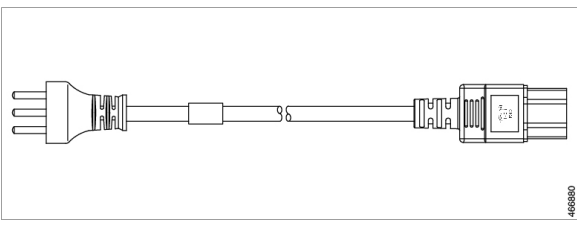
**Note** • The power cords for C9500X have an IEC60320/C21 appliance connector at one end.

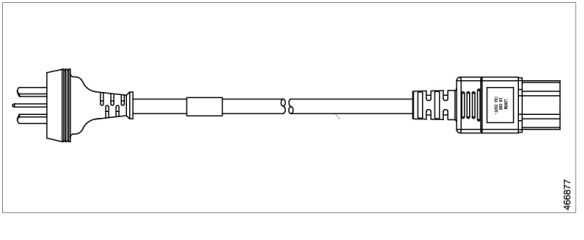
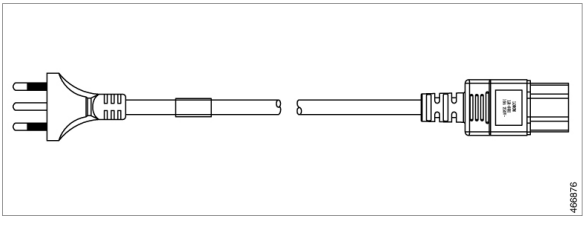
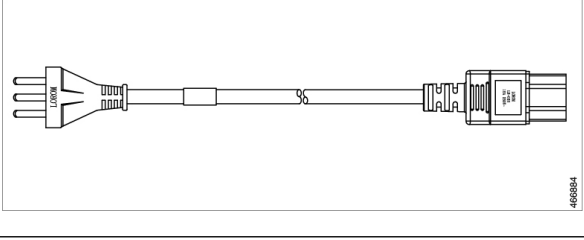
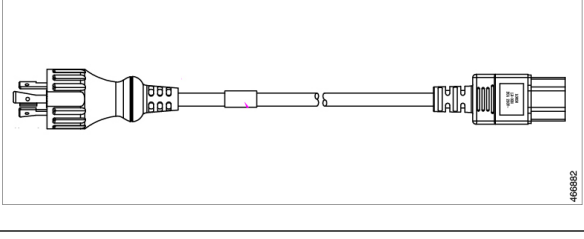
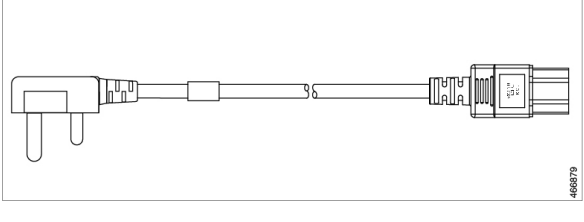
*Figure 32: IEC60320/C21 Appliance Connector*

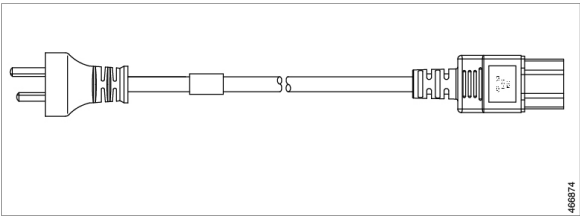


**Table 15: AC Power Cords for C9500X Series Switches**

Locale	Part Number	Cordset Rating	Length	Plug Type
United States of America	PWR-CAB-AC-USA520	125 VAC, 20 A	4.25 m	<p><i>Figure 33: PWR-CAB-AC-USA520= (United States of America)</i></p>
United States of America	PWR-CAB-AC-USA	250 VAC, 20 A	4.25 m	<p><i>Figure 34: PWR-CAB-AC-USA= (United States of America)</i></p>
Australia	PWR-CAB-AC-AUS	250 VAC, 15 A	4.25 m	<p><i>Figure 35: PWR-CAB-AC-AUS= (Australia)</i></p>

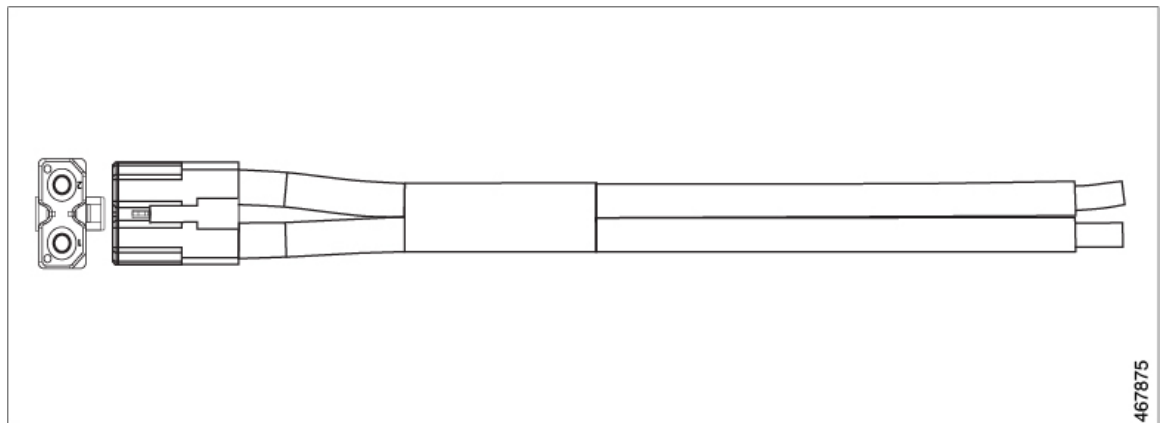
Locale	Part Number	Cordset Rating	Length	Plug Type
Europe	PWR-CAB-AC-EU	250 VAC, 16 A	4.25 m	<p><b>Figure 36: PWR-CAB-AC-EU= (Europe)</b></p> 
Italy	PWR-CAB-AC-ITA	250 VAC, 16 A	4.25 m	<p><b>Figure 37: PWR-CAB-AC-ITA (Italy)</b></p> 
South Africa	PWR-CAB-AC-SA	250 VAC, 16 A	4.25 m	<p><b>Figure 38: PWR-CAB-AC-SA= (South Africa)</b></p> 
United Kingdom	PWR-CAB-AC-UK	250 VAC, 16 A	4.25 m	<p><b>Figure 39: PWR-CAB-AC-UK= (United Kingdom)</b></p> 
Israel	PWR-CAB-AC-ISRL	250 VAC, 16 A	4.25 m	<p><b>Figure 40: PWR-CAB-AC-ISRL= (Israel)</b></p> 

Locale	Part Number	Cordset Rating	Length	Plug Type
China	PWR-CAB-AC-CHN	250 VAC, 16 A	4.25 m	<p><b>Figure 41: PWR-CAB-AC-CHN= (China)</b></p> 
Brazil	PWR-CAB-AC-BRA	250 VAC, 16 A	4.25 m	<p><b>Figure 42: PWR-CAB-AC-BRA= (Brazil)</b></p> 
Switzerland	PWR-CAB-AC-SUI	250 VAC, 16 A	4.25 m	<p><b>Figure 43: PWR-CAB-AC-SUI= (Switzerland)</b></p> 
Japan	PWR-CAB-AC-JPN	250 VAC, 20 A	4.25 m	<p><b>Figure 44: CAB-TA-250V-JP= (Japan)</b></p> 
India	PWR-CAB-AC-IND	250 VAC, 16 A	4.25 m	<p><b>Figure 45: PWR-CAB-AC-IND= (India)</b></p> 

Locale	Part Number	Cordset Rating	Length	Plug Type
Argentina	PWR-CAB-AC-ARG	250 VAC, 16 A	4.25 m	<p><i>Figure 46: PWR-CAB-AC-ARG= (Argentina)</i></p>  <p>466874</p>

## DC Power Cable Specifications

*Figure 47: PWR-2KW-DC-CBL*





## APPENDIX **B**

# Understanding the LEDs

The switch consists of multiple LEDs to monitor switch activity and performance. You can also monitor the status of the fan tray assembly and the power supplies.

- [LED Indicators, on page 73](#)
- [System LED, on page 75](#)
- [Power Supply LEDs, on page 75](#)
- [Port LEDs and Modes, on page 75](#)
- [Beacon LED, on page 76](#)
- [Fan LED, on page 76](#)
- [Ethernet Management Port LED, on page 76](#)

## LED Indicators

### LEDs on Cisco Catalyst 9500X Series Switches

Cisco Catalyst 9500X Series Switches have LEDs on the front and the rear panel of the chassis. Following illustration helps you identify the various LEDs available on the front and the rear panel of the switch.

**Figure 48: LEDs on the Front Panel of C9500X-28C8D**

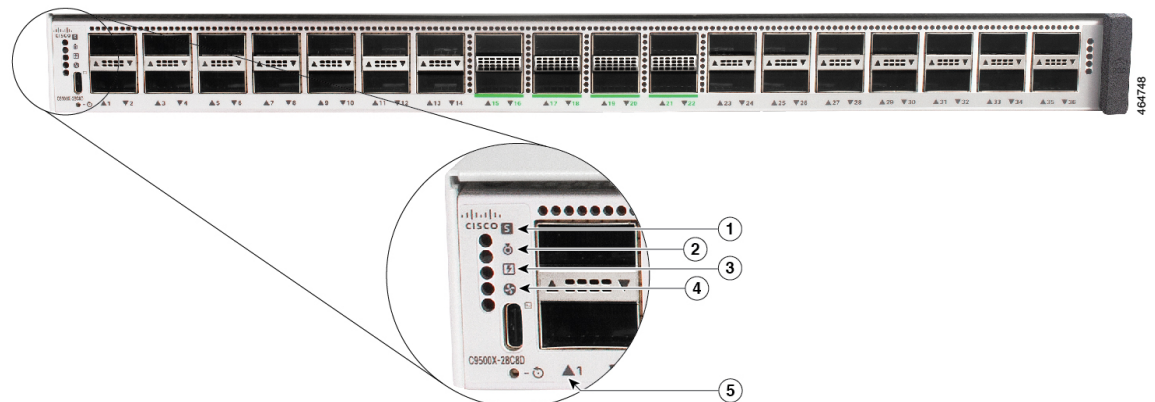
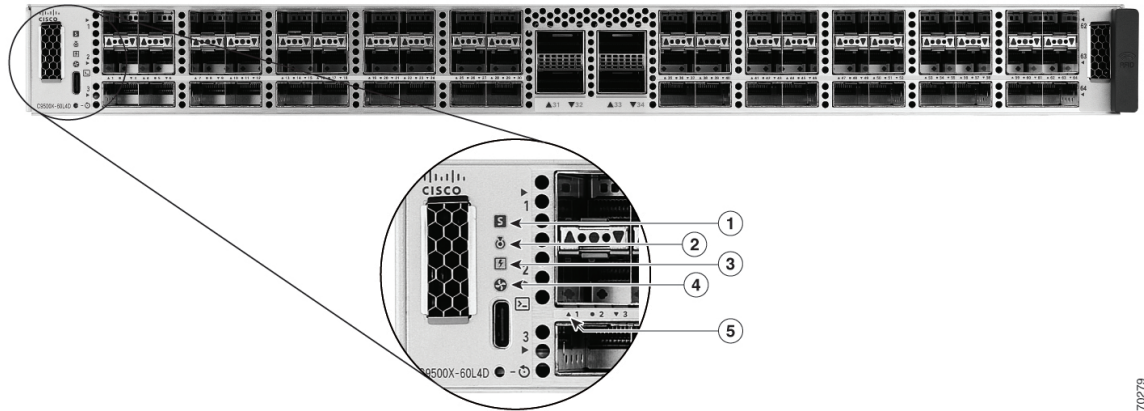


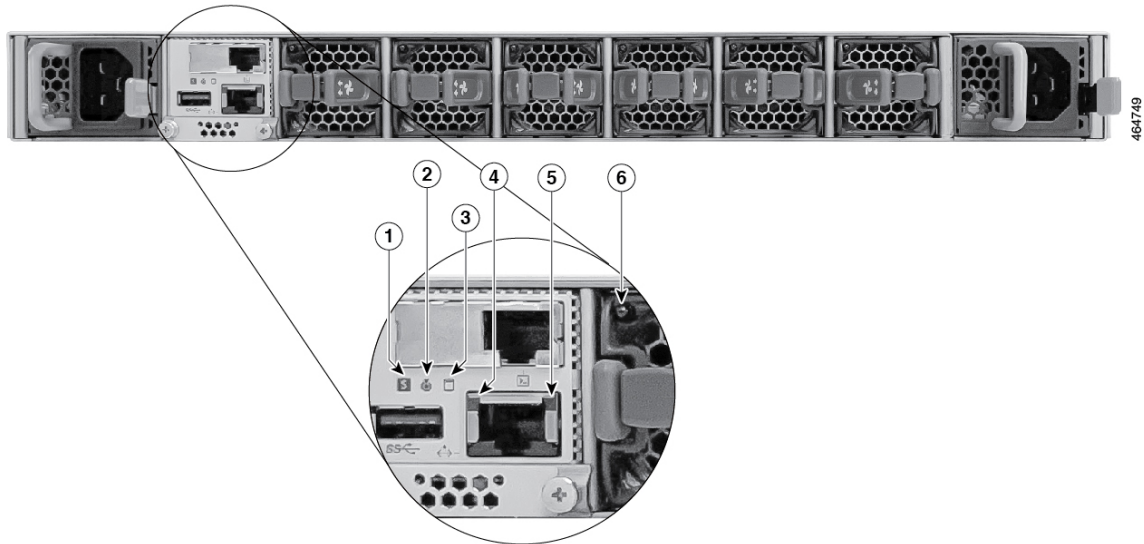
Figure 49: LEDs on the Front Panel of C9500X-60L4D



470279

1	System LED	4	Fan Module LED
2	Blue beacon LED	5	Port LEDs
3	Power Supply Unit (PSU) LED	-	-

Figure 50: LEDs on the Rear Panel



464749

1	System LED	4	Ethernet Management port link status LED
2	Blue beacon LED	5	Ethernet Management port link activity LED
3	SSD LED	6	Fan LED

## System LED

The system LED indicates the status of the system.

**Table 16: System LED Indicator**

Color/State	Description
Off	System is not operational.
Green	System is operating normally without alarms.
Amber	System has triggered a minor environmental alarm.
Red	System has triggered a major environmental alarm.

## Power Supply LEDs

**Table 17: Power Supply LED Indicators for Two PSUs**

Color/State	Description
Green	Power supply is operating normally. Both PSUs are in the bay with active power.
Amber	One of the PSU has input loss.
Red	One of the PSU has output failure.

If only one power supply module is installed in the switch and it is operating normally, the power supply LED turns green. If the single power supply unit fails, the switch is powered off.

## Port LEDs and Modes

The port LEDs display only the port status.

**Table 18: Meaning of Switch LED Colors for Port Status LED**

Port LED Color	Meaning
Green	Port link is up.
Amber	Port link is disabled, that is, administratively down.
Off	No signal is detected, the link is down, or the port is not connected.
Alternating Green and Amber	Indicates port beacon.

Port LED Color	Meaning	
Blinking Amber	Indicates link faults such as excessive collision, CRC errors and Jabber errors.	
Blinking Green	Indicates traffic on the port.	
	Traffic Utilization	Blinking Rate
	Less than 5%	Nil
	Between 5% and 30%	At a rate of 1.2 seconds.
	Between 30% and 70%	At a rate of 0.4 seconds.
More than 70%	At a rate of 0.2 seconds.	

## Beacon LED

The UID and the Beacon LED can be turned on by the administrator to indicate that the switch needs attention. It helps the administrator identify the switch. The beacon can be turned on by either pressing the UID button on the switch front panel, or by using the CLI. There is a blue beacon on the front and rear panel of the switch. The blue beacon on the front panel is a button labeled UID, and on the back panel it is a LED labeled BEACON.

Color/State	Description
Solid blue	The operator has indicated that the system needs attention.

## Fan LED

*Table 19: Fan LED Indicator*

Color/State	Description
Off	The fan is not receiving power; the fans have stopped.
Green	The fan is operating normally.
Amber	The fan has encountered a fault.

## Ethernet Management Port LED

The following table describes the colors and the descriptions of the LEDs for link activity and link status of the Ethernet management port.



**Table 20: Ethernet Management Port Link Activity LED**

<b>Color</b>	<b>Description</b>
Blinking green	Link is up.
Off	Link is down.

**Table 21: Ethernet Management Port Link Status LED**

<b>Color</b>	<b>Description</b>
Solid green	Link is up.
Off	Link is down.





# APPENDIX **C**

## Connector and Cable Specifications

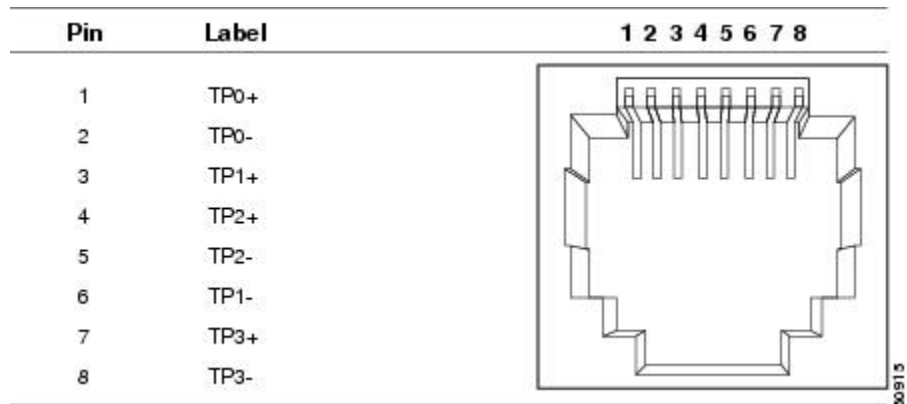
- Connector Specifications, on page 79
- Console Cables, on page 80
- Cables and Adapters, on page 81

### Connector Specifications

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

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

*Figure 51: 10/100/1000 Port Pinouts*



### Module Connectors

*Figure 52: Duplex LC Cable Connector*

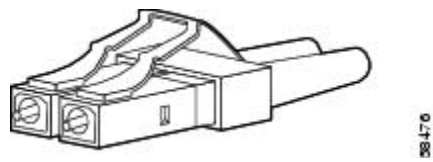


Figure 53: Simplex LC Cable Connector

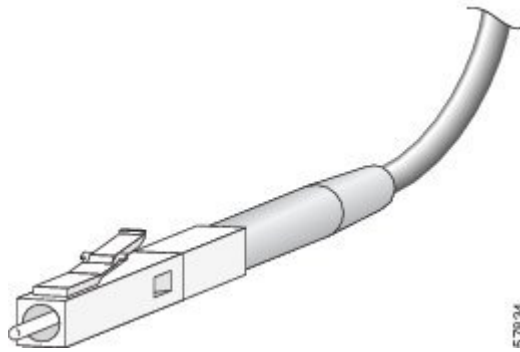


Figure 54: Copper SFP Module LC Connector

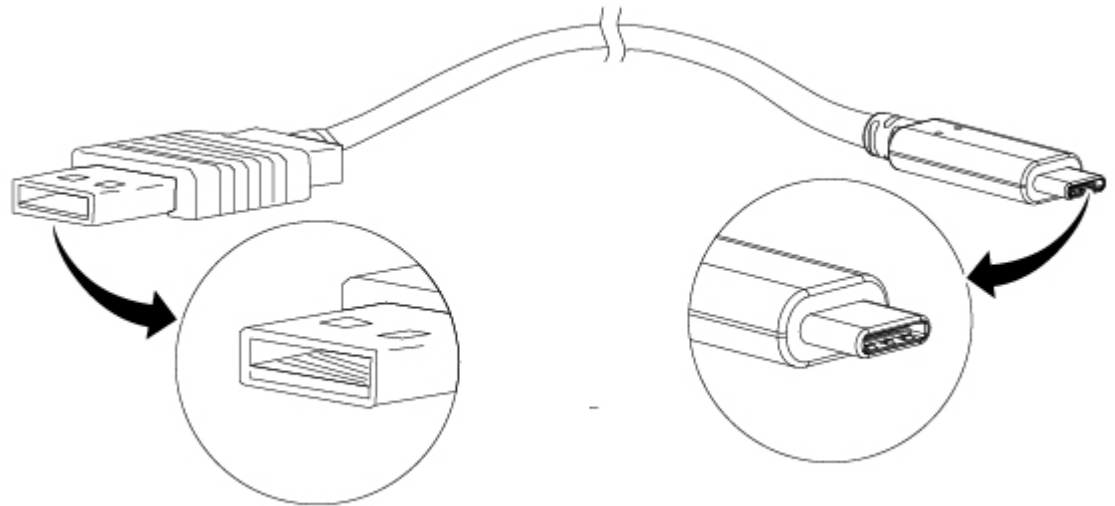
Pin	Label	1	2	3	4	5	6	7	8
1	TP0+								
2	TP0-								
3	TP1+								
4	TP2+								
5	TP2-								
6	TP1-								
7	TP3+								
8	TP3-								

## Console Cables

Switch Name	Supported Console Cable
Cisco Catalyst 9500X Series Switches	USB Type A to Type C (CAB-USBC-4M-GR)

The USB console port uses a USB Type A to Type C cable. These cables are not supplied with the switch; you have to order them separately.

Figure 55: USB Type A to Type C Cable



The USB-C console port uses a USB Type A to Type C cable for console connections.

## Cables and Adapters

### Transceiver Module Network Cables

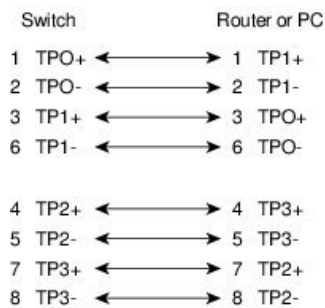
For cabling specifications, refer to the following notes:

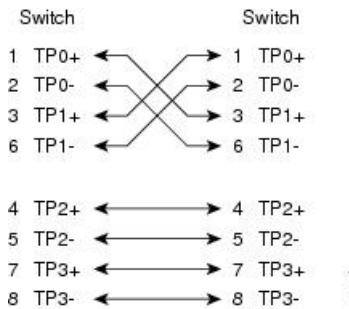
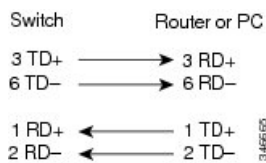
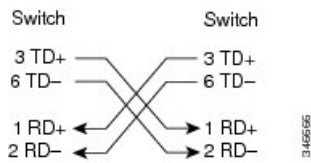
- [Cisco SFP and SFP+ Transceiver Module Installation Notes](#)
- [Cisco 40-Gigabit QSFP+ Transceiver Modules Installation Note](#)

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

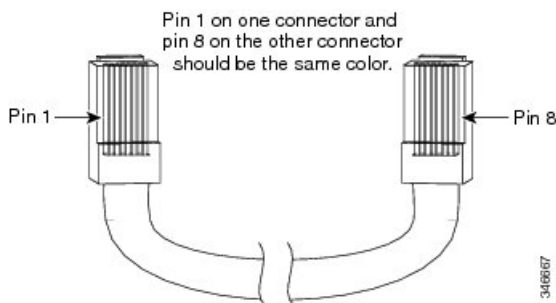
Figure 56: Four Twisted-Pair Straight-Through Cable Schematic



**Figure 57: Four Twisted-Pair Semi-Cross Cable Schematic****Figure 58: Two Twisted-Pair Straight-Through Cable Schematic****Figure 59: 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.

**Figure 60: 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 22: 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
TxD	2	RxD
GND	5	GND
GND	5	GND
RxD	3	TxD

*Table 23: 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
TxD	3	RxD
GND	7	GND
GND	7	GND
RxD	2	TxD







## APPENDIX **D**

# Configuring the Switch

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- [Configuring the Switch Using the Web User Interface, on page 85](#)
- [Configuring the Switch Using the CLI, on page 85](#)

## Configuring the Switch Using the Web User Interface

For instructions on setting up the switch using the WebUI, refer to the required version of the [software configuration guide](#). In the guide, go to *Configuring the Switch Using the Web User Interface*.

## Configuring the Switch Using the CLI

### 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 RJ45 Console Port

#### Procedure

- 
- Step 1** Connect the RJ45 port adapter to the serial port on the terminal server or your PC using the optional RJ45-to-DB9 adapter cable. 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 Putty or TeraTerm, 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.

**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 Microsoft Windows USB Device Driver, on page 86](#).

**Note** USB Type A port on the switch provides file system support and is **NOT** a console port. See USB Type A Port section.

**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 Putty or TeraTerm, 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 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 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.
- Windows 10 includes a USB to RS232 driver. However for added functionality, download the USB Console Software from the Software Download Center at cisco.com.
- Step 2** If using 32-bit Windows, double-click the setup.exe file in the Windows\_32 folder. If using 64-bit Windows, 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 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**.
-





## APPENDIX **E**

### Accessory Kit Contents

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- [19-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500X Series Switches](#) , on page 89
- [23-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500X Series](#) , on page 90
- [Extension Rails and Brackets for Four-Point Mounting for Cisco Catalyst 9500X Series Switches](#), on page 90

## 19-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500X Series Switches

The 19-inch rack mount accessory kit for Cisco Catalyst 9500X Series Switches contains the following items:

Item	Quantity
19-inch mounting brackets	2
Cable guides	1
Number-12 pan-head 0.50" long screws	4
M4.0 x 20mm Phillips pan-head screws (Black color)	1
M4.0 x 6mm Phillips flat-head screws	12
Number-10 pan-head 0.625" long screws	4
Ground lug	1
Ground bracket	1
M4.0 x 6mm pan-head screws	2
M4.0 x 6mm flat-head screws	2

## 23-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500X Series

The 23-inch rack mount accessory kit for Cisco Catalyst 9500X Series Switches contains the following items:

Item	Quantity
23-inch mounting brackets	2
Cable guides	1
Number-12 pan-head 0.50" long screws	4
M4.0 x 20mm Phillips pan-head screws (Black color)	1
M4.0 x 6mm Phillips flat-head screws	12
Number-10 pan-head 0.625" long screws	4

## Extension Rails and Brackets for Four-Point Mounting for Cisco Catalyst 9500X Series Switches

The extension rails and brackets for four-point mounting accessory kit for Cisco Catalyst 9500X Series Switches contains the following items:

Item	Quantity
Extension rails and brackets for four-point mounting	2 sets
19-inch mounting brackets	2
M4.0 x 6mm Phillips flat-head screws	24
Number-10 pan-head 0.625" long screws	8
Number-12 pan-head 0.50" long screws	8