



Cisco Catalyst 9500 Series Switches Hardware Installation Guide

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Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883



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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 ^D or Ctrl-D 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.)
bold font	Commands and keywords and user-entered text appear in bold font .
<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> .
Bold Courier font	Bold Courier font 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.



Warning 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 provided at the end of each warning statement to locate its translation in the translated safety warnings for this device. Statement 1071

SAVE THESE INSTRUCTIONS



Warning 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.

Statement 1089

Related Documentation



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:

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CHAPTER 2

Product Overview

The Cisco Catalyst 9500 Series Switches family consists of fixed core and aggregation layer switches supporting redundant power supplies and modular fans. The Cisco Catalyst 9500 Series offers switch models with downlink ports of the following types:

- 8 ports of 400G QSFP-DD
- 16, 28 and 32 ports of 100G QSFP28
- 12, 24 and 32 ports of 40G QSFP
- 24 and 48 ports of 25G SFP28
- 16, 24, 40 and 48 ports of 10G SFP/SFP28

The Catalyst 9500 Series Switches provide support for the following features:

- Uplink connectivity
 - Network modules with SFP and QSFP uplink ports that provide 10G and 40G connectivity on C9500-16X and C9500-40X switches.
 - Fixed QSFP uplink ports that support 40G/100G connectivity on C9500-24Y4C and C9500-48Y4C switches.
- 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, USB Mini-Type B and USB Type C console ports.
- Supports SATA SSD storage for container-based application hosting on select switch models.
- [Switch Models, on page 6](#)
- [Front Panel, on page 7](#)
- [Rear Panel, on page 19](#)

Switch Models

Table 1: Switch Models — Base PIDs

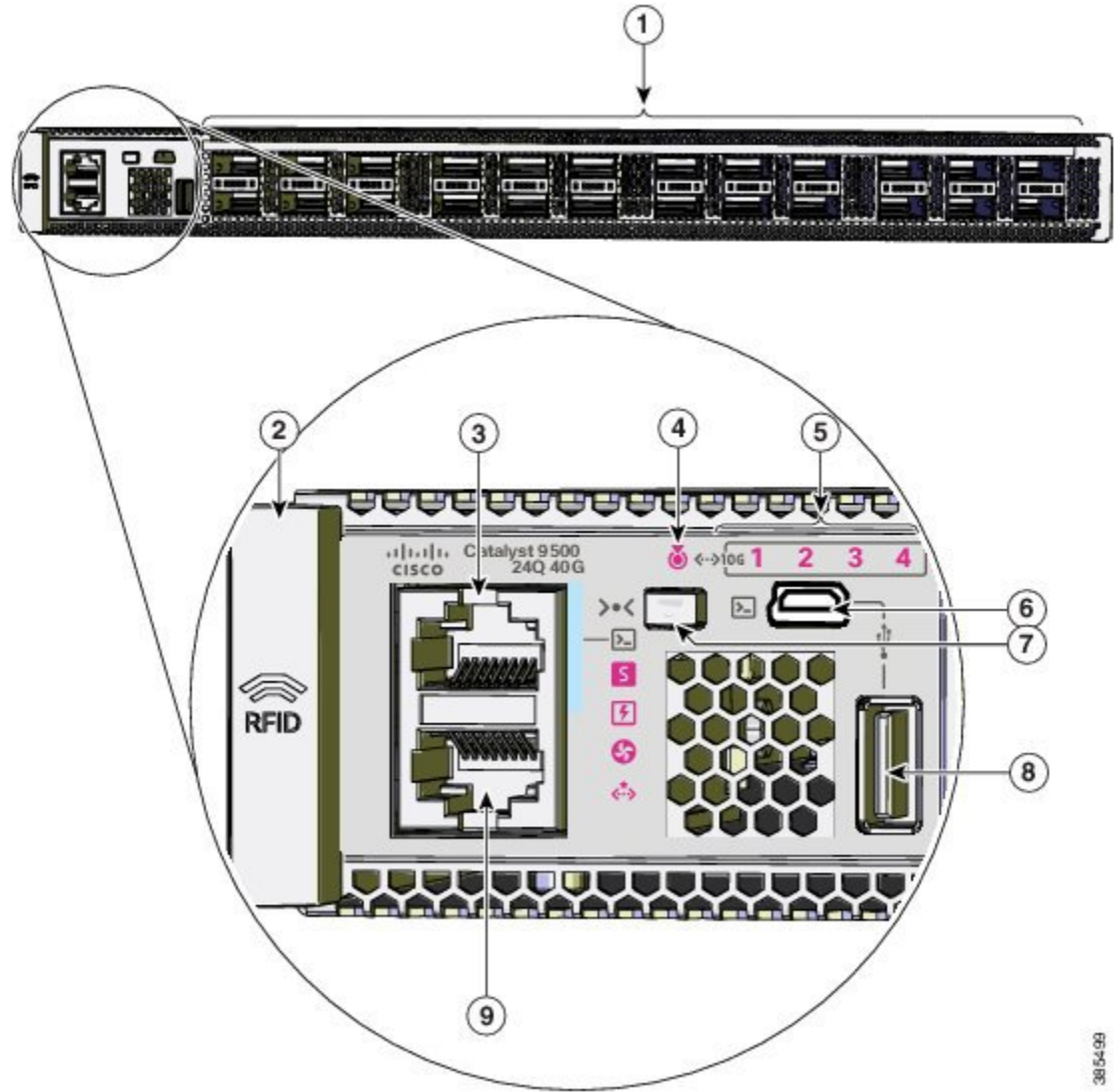
Switch Model	Description
Cisco Catalyst 9500 Series Switches	
C9500-12Q	12x40 Gigabit Ethernet QSFP+ ports and 2 power supply slots
C9500-24Q	24x40 Gigabit Ethernet QSFP+ ports and 2 power supply slots
C9500-16X	16x10 Gigabit Ethernet SFP/SFP+ ports and 2 power supply slots; supports optional network modules on uplinks ports — 8x10 Gigabit Ethernet(SFP/SFP+) and 2x40 Gigabit Ethernet(QSFP+)
C9500-40X	40x10 Gigabit Ethernet SFP/SFP+ ports and 2 power supply slots; supports optional network modules on uplink ports — 8x10 Gigabit Ethernet(SFP/SFP+) and 2x40 Gigabit Ethernet(QSFP+)
Cisco Catalyst 9500 Series High Performance Switches	
C9500-32C	32x40G/100G QSFP28 ports and 2 power supply slots
C9500-32QC	32x40G or 16x100G QSFP28 ports and 2 power supply slots
C9500-24Y4C	24x1G/10G/25G SFP28 ports and 2 power supply slots; 4x40G/100G QSFP28 fixed uplink ports
C9500-48Y4C	48x1G/10G/25G SFP28 ports and 2 power supply slots; 4x40G/100G QSFP28 fixed uplink ports

Table 2: Switch Models — Bundle PIDs

Switch Model	Description
C9500-16X-2Q	16x10 Gigabit Ethernet SFP/SFP+ ports and 2x40 Gigabit Ethernet (QSFP+) network module on uplink ports; and two power supply slots
C9500-40X-2Q	40 10-Gigabit Ethernet SFP/SFP+ ports and 2x40 Gigabit Ethernet (QSFP+) network module on uplink ports; and two power supply slots
C9500-24X	16x10 Gigabit Ethernet SFP/SFP+ ports and 8x10 Gigabit Ethernet (SFP/SFP+) network module on uplink ports; and two power supply slots
C9500-48X	40x10 Gigabit Ethernet SFP/SFP+ ports and 8x10 Gigabit Ethernet (SFP/SFP+) network module on uplink ports; and two power supply slots

Front Panel

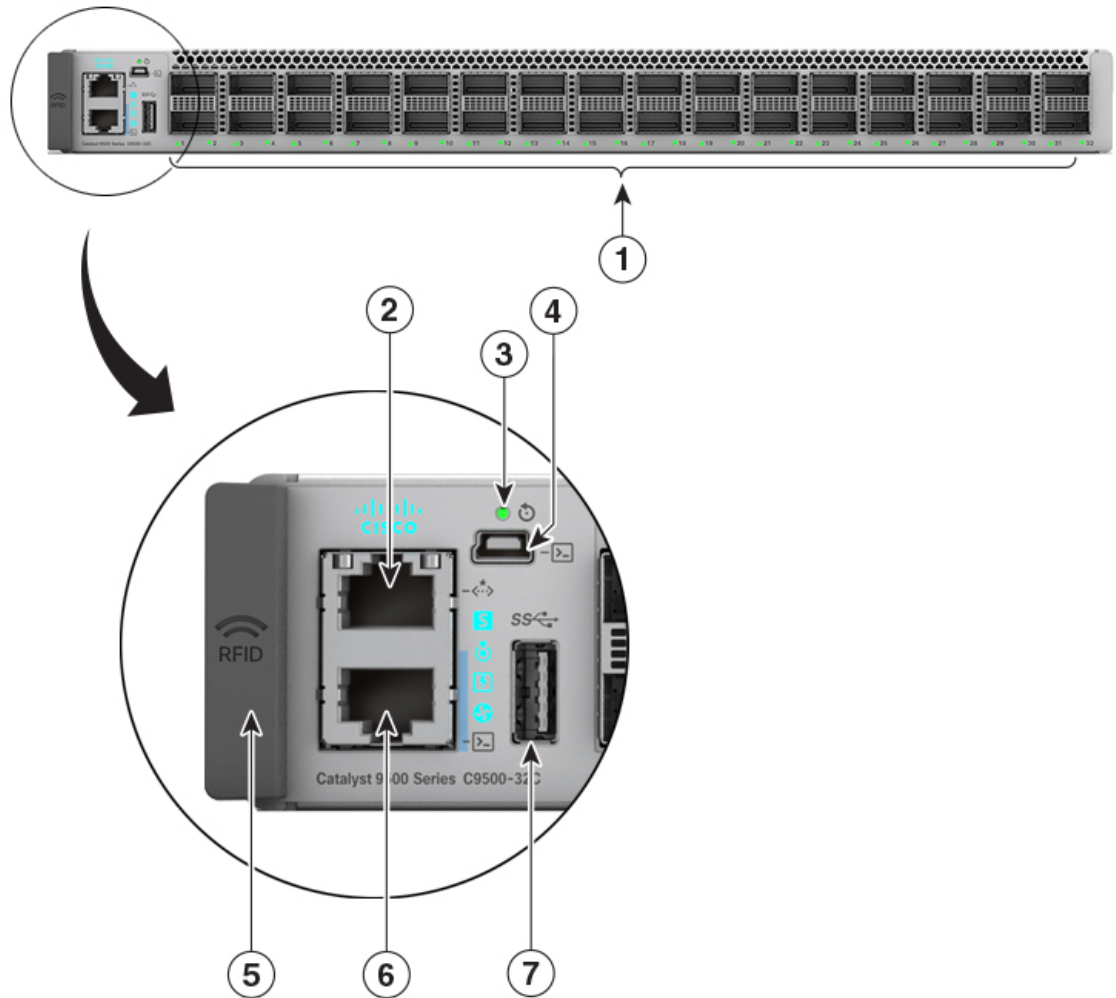
Figure 1: Front Panel of a 24-Port Cisco Catalyst 9500 Switch



38154-99

1	24 40G QSFP ports	6	USB mini Type B console port
2	RFID	7	Mode button
3	Console port (RJ-45 Serial)	8	USB 2.0 host port
4	Blue beacon LED	9	Ethernet management RJ-45 port
5	10G Status LEDs		

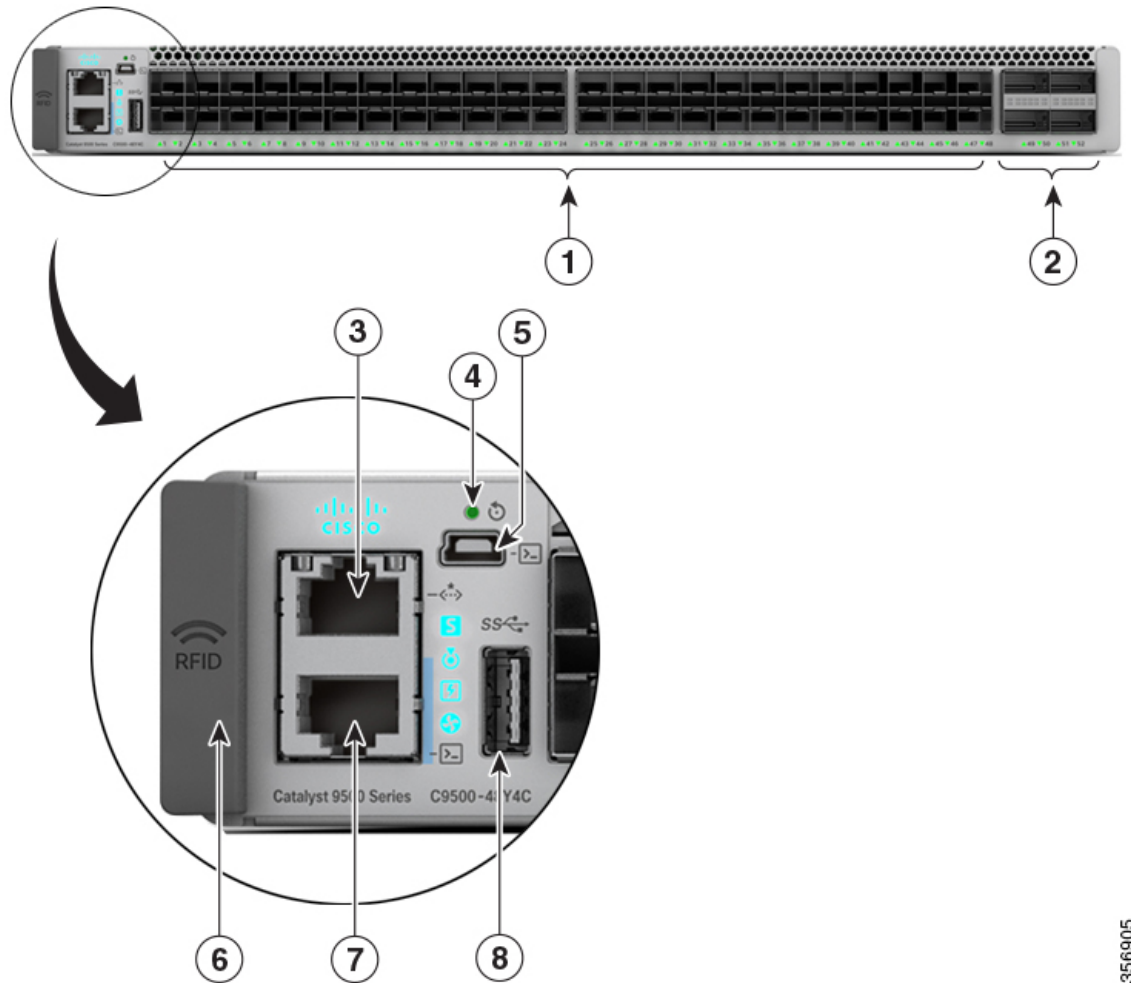
Figure 2: Front Panel of a Cisco Catalyst 9500 High Performance Switch (C9500-32C)



356903

1	32 40G/100G QSFP28 ports	5	RFID
2	Ethernet management port	6	Console port (RJ-45 Serial)
3	Reset button	7	USB 3.0 host port
4	USB mini Type B console port		

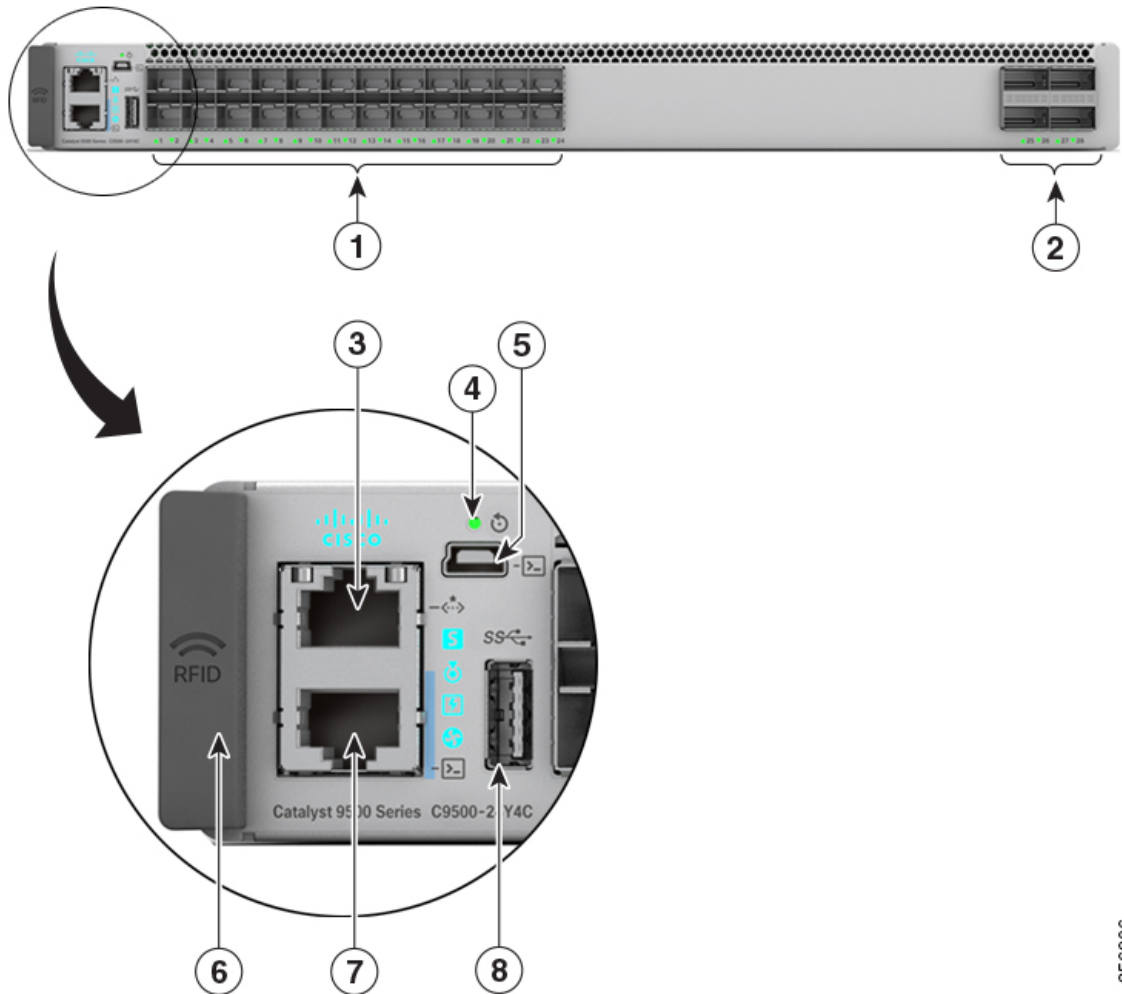
Figure 3: Front Panel of a 48-Port Cisco Catalyst 9500 High Performance Switch (C9500-48Y4C)



356905

1	48 1G/10G/25G SFP28 ports	5	USB mini Type B console port
2	Uplink ports	6	RFID
3	Ethernet management port	7	Console port (RJ-45 Serial)
4	Reset button	8	USB 3.0 host port

Figure 4: Front Panel of a 24-Port Cisco Catalyst 9500 High Performance Switch (C9500-24Y4C)



356906

1	24 1G/10G/25G SFP28 ports	5	USB mini Type B console port
2	Uplink ports	6	RFID
3	Ethernet management port	7	Console port (RJ-45 Serial)
4	Reset button	8	USB 3.0 host port

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 9500 Series Switches are as follows :

Table 3: Cisco Catalyst 9500 Series Switch Models

Switch model	Supported ports
Cisco Catalyst 9500 Series Switches	
C9500-12Q	Supports standard 12x40G QSFP+ modules.
C9500-24Q	Supports standard 24x40G QSFP+ modules.
C9500-16X	Supports standard 16x10G SFP modules. The uplink ports support 8x10G SFP/SFP+ modules and 2x40G QSFP+ modules.
C9500-40X	Supports standard 40x10G SFP modules. The uplink ports support 8x10G SFP/SFP+ modules and 2x40G QSFP+ modules.
Cisco Catalyst 9500 Series High Performance Switches	
C9500-32C	Supports standard 32x100G or 32x40G QSFP28 modules; all ports are 100G/40G capable.
C9500-32QC	Supports standard 16x100G or 32x40G QSFP28 modules; only the ports in the top row are 100G capable.
C9500-24Y4C	Supports standard 24x25G or 24x10G SFP28 modules; all ports are 25G/10G/1G capable. The uplink ports support 4x100G or 4x40G QSFP+ modules.
C9500-48Y4C	Supports standard 48x25G or 48x10G SFP28 modules; all ports are 25G/10G/1G capable. The uplink ports support 4x100G or 4x40G QSFP28 modules.



Note For information about SFP and QSFP network modules, see [Network Modules, on page 18](#).

Support for Breakout Cables

On Cisco Catalyst 9500 Series High Performance Switches, breakout cables are supported only on the C9500-32C model. 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.

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

Port Mapping for Cisco Catalyst 9500 Series Switches

The odd-numbered ports are on the upper row and the even-numbered ports on the lower row. The following figures show how the ports and the LEDs are numbered on different switch models. This section also explains

the port mapping between 40G and 10G ports for the switches when configuring 40G ports to operate as four 10G ports using breakout cables.

C9500-12Q

Figure 5: 40G native port numbering

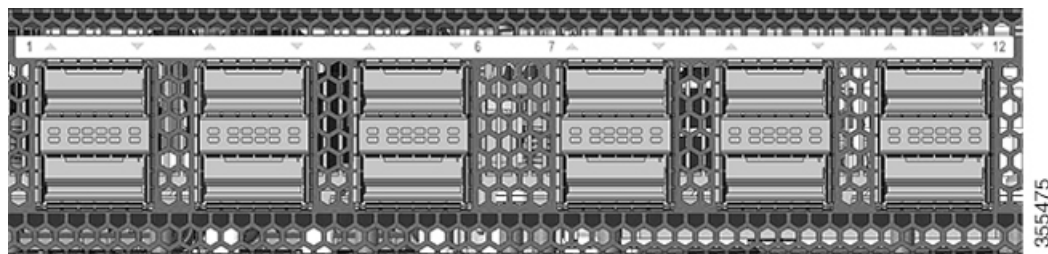


Table 4: Port mapping for C9500-12Q

40-Gigabit native ports	Configurable 10-Gigabit ports with Breakout Cable
1	1, 2, 3, and 4
2	5, 6, 7, and 8
3	9, 10, 11, and 12
4	13, 14, 15, and 16
5	17, 18, 19, and 20
6	21, 22, 23, and 24
7	25, 26, 27, and 28
8	29, 30, 31, and 32
9	33, 34, 35, and 36
10	37, 38, 39, and 40
11	41, 42, 43, and 44
12	45, 46, 47, and 48

C9500-24Q

Figure 6: 40G native port numbering



Table 5: Port mapping for C9500-24Q

40-Gigabit native ports	Configurable 10-Gigabit ports with Breakout Cable
1	1, 2, 3, and 4
2	5, 6, 7, and 8
3	9, 10, 11, and 12
4	13, 14, 15, and 16
5	17, 18, 19, and 20
6	21, 22, 23, and 24
7	25, 26, 27, and 28
8	29, 30, 31, and 32
9	33, 34, 35, and 36
10	37, 38, 39, and 40
11	41, 42, 43, and 44
12	45, 46, 47, and 48
13	49, 50, 51, and 52
14	53, 54, 55, and 56
15	57, 58, 59 and 60
16	61, 62, 63, and 64
17	65, 66, 67 and 68
18	69, 70, 71, and 72
19	73, 74, 75, and 76
20	77, 78, 79, and 80
21	81, 82, 83, and 84
22	85, 86, 87, and 88
23	89, 90, 91, and 92
24	93, 94, 95, and 96

C9500-16X

Figure 7: 10G native port numbering

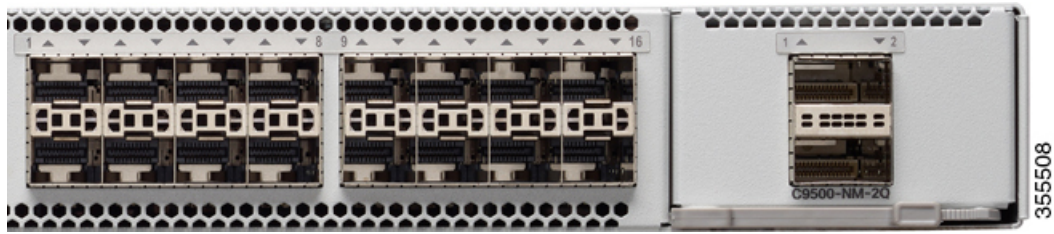


Table 6: Port mapping for C9500-16X

40-Gigabit Uplink ports	Configurable 10-Gigabit ports with Breakout Cable
17	1, 2, 3, and 4
18	5, 6, 7, and 8

C9500-40X

Figure 8: 10G native port numbering

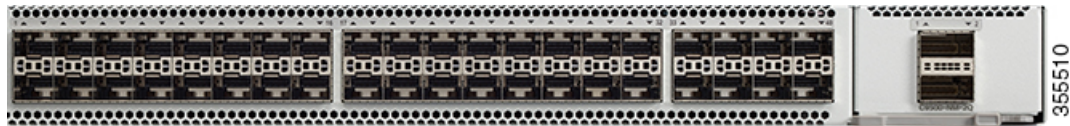


Table 7: Port mapping for C9500-40X

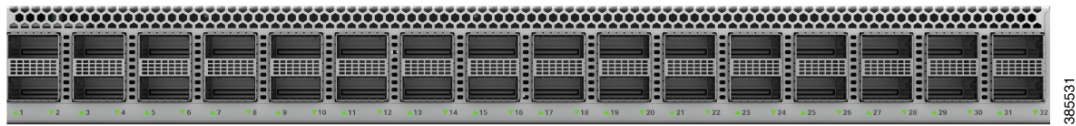
40-Gigabit Uplink ports	Configurable 10-Gigabit ports with Breakout Cable
41	1, 2, 3, and 4
42	5, 6, 7, and 8

Port Mapping for Cisco Catalyst 9500 Series High Performance Switches

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

C9500-32C

Figure 9: Native Port Numbering for C9500-32C



All the 32 ports can be configured as 100G or 40G.

Port Type	Port Number on the Switch
100G native ports	1—32
40G native ports	1—32

Breakout is supported only on 24 ports of the C9500-32C switch model. Every 4th port of C9500-32C does not support breakout due to ASIC limitation. Port numbers 4, 8, 12, 16, 20, 24, 28 and 32 do not support breakout. When you enable breakout on a native port, the port numbering convention changes from 3-tuple to 4-tuple. For example, if you enable breakout on port number 2 which is represented as Hu1/0/2, four logical ports are created which are represented as Hu1/0/2/1, Hu1/0/2/2, Hu1/0/2/3 and Hu1/0/2/4.

Table 8: Port mapping for C9500-32C

40G/100G native ports	Configurable 10G/25G ports with Breakout Cable	40G/100G native ports	Configurable 10G/25G ports with Breakout Cable
1	1/0/1/1, 1/0/1/2, 1/0/1/3, 1/0/1/4	17	1/0/17/1, 1/0/17/2, 1/0/17/3, 1/0/17/4
2	1/0/2/1, 1/0/2/2, 1/0/2/3, 1/0/2/4	18	1/0/18/1, 1/0/18/2, 1/0/18/3, 1/0/18/4
3	1/0/3/1, 1/0/3/2, 1/0/3/3, 1/0/3/4	19	1/0/19/1, 1/0/19/2, 1/0/19/3, 1/0/19/4
4	Not applicable	20	Not applicable
5	1/0/5/1, 1/0/5/2, 1/0/5/3, 1/0/5/4	21	1/0/21/1, 1/0/21/2, 1/0/21/3, 1/0/21/4
6	1/0/6/1, 1/0/6/2, 1/0/6/3, 1/0/6/4	22	1/0/22/1, 1/0/22/2, 1/0/22/3, 1/0/22/4
7	1/0/7/1, 1/0/7/2, 1/0/7/3, 1/0/7/4	23	1/0/23/1, 1/0/23/2, 1/0/23/3, 1/0/23/4
8	Not applicable	24	Not applicable
9	1/0/9/1, 1/0/9/2, 1/0/9/3, 1/0/9/4	25	1/0/25/1, 1/0/25/2, 1/0/25/3, 1/0/25/4
10	1/0/10/1, 1/0/10/2, 1/0/10/3, 1/0/10/4	26	1/0/26/1, 1/0/26/2, 1/0/26/3, 1/0/26/4
11	1/0/11/1, 1/0/11/2, 1/0/11/3, 1/0/11/4	27	1/0/27/1, 1/0/27/2, 1/0/27/3, 1/0/27/4
12	Not applicable	28	Not applicable
13	1/0/13/1, 1/0/13/2, 1/0/13/3, 1/0/13/4	29	1/0/29/1, 1/0/29/2, 1/0/29/3, 1/0/29/4
14	1/0/14/1, 1/0/14/2, 1/0/14/3, 1/0/14/4	30	1/0/30/1, 1/0/30/2, 1/0/30/3, 1/0/30/4
15	1/0/15/1, 1/0/15/2, 1/0/15/3, 1/0/15/4	31	1/0/31/1, 1/0/31/2, 1/0/31/3, 1/0/31/4
16	Not applicable	32	Not applicable

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

C9500-32QC

Figure 10: Native Port Numbering for C9500-32QC



Port Type	Port Number on the Switch
40G native ports	1—32
100G native ports	33—48

The 40G ports on this switch can be configured to function as 100G ports using the Command Line Interface (CLI). For more information about mode conversion, see "Configuring Interface Characteristics" in *Interface and Hardware Components Configuration Guide*.

C9500-24Y4C

Figure 11: Native Port Numbering for C9500-24Y4C



Port Type	Port Number on the Switch
25G native ports	1—24
40G or 100G native ports	25—28

C9500-48Y4C

Figure 12: Native Port Numbering for C9500-48Y4C



Port Type	Port Number on the Switch
25G native ports	1—48
40G or 100G native ports	49—52

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](#).

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 mini-Type B console port (5-pin connector).
- USB-C console port

If you use the USB mini-Type B or 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.

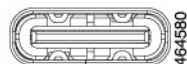
The 4-pin mini-Type B connector resembles the 5-pin mini-Type B connectors. They are not compatible. Use only the 5-pin mini-Type B.

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

Figure 13: USB Mini-Type B Port



Figure 14: 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.

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 up to 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. USB 2.0 port supports Cisco USB flash drives with capacities from 128 MB to 8 GB (USB devices with port densities of 128 MB, 256 MB, 1 GB, 4 GB, and 8 GB are supported). 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 host ports are located on different sides of the switches as follows:

- Cisco Catalyst 9500 Series Switches: USB 2.0 port on the front panel and USB 3.0 port on the rear panel.
- Cisco Catalyst 9500 Series High Performance Switches: USB 3.0 port on the front panel.

Mode Button

The mode button has the following function:

- Blue Beacon Mode — works with blue beacon LED to indicate that the switch needs attention
- 10G Status LED Mode — works with 10G Status LEDs to indicate status of 10G ports

Blue Beacon Mode

The blue beacon mode has higher priority over the 10G status LED mode and reset mode. The blue beacon LED can be provisioned by the operator to indicate that the switch needs attention.

10G Status LED Mode

Each 40G port can be configured to function as a 10G port using a Cisco QSFP to four SFP Active Optical Breakout Cables that connect a 40G QSFP port of the switch on one end to four 10G SFP ports of the switch on the other end. After system bootup, the four 10G Status LEDs indicate the status of 10G ports 1-4 by default which maps to 40G port number 1. A short press on the mode button moves the pointer to the next 10G group (5-8) which maps to 40G port number 2. You can check the status of all the 96 10G ports by pressing the mode button 24 times, after which it rolls back to 10G port 1-4.

Network Modules

The C9500-16X and C9500-40X switch models support two network modules that provide uplink ports to connect to other devices. The switch should only be operated with either a network module or a blank module installed.

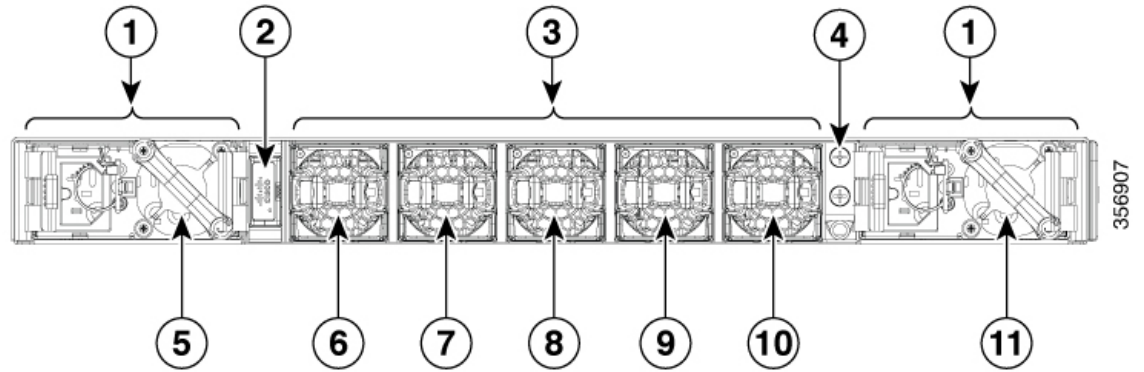
Table 9: Network Modules

Network Module	Description
C9500-NM-8X	This module has eight 10G SFP ports. Any combination of standard SFP modules are supported.
C9500-NM-2Q	This module has two 40G QSFP ports. Any combination of standard QSFP modules are supported.

For information about the network modules, see Installing the Network Modules section. For cable specifications, see Cables and Adapters section.

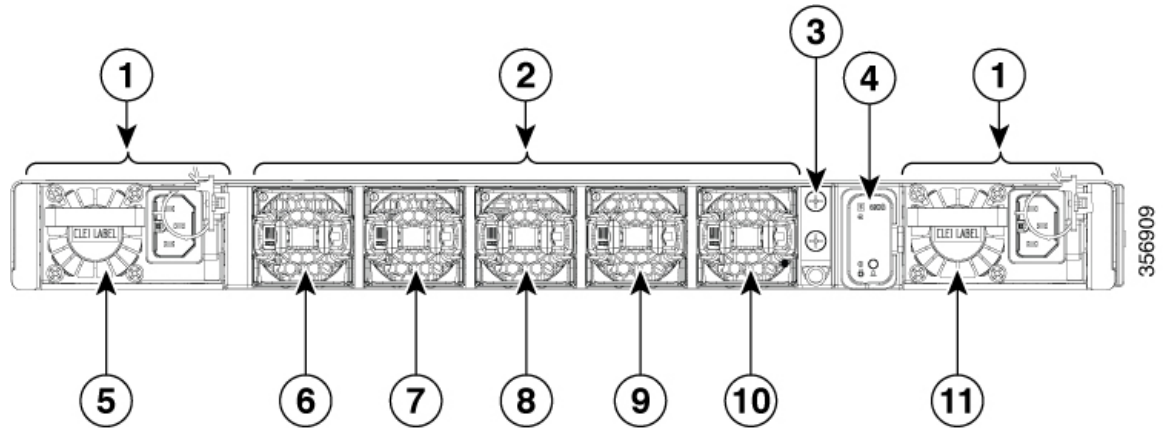
Rear Panel

Figure 15: Rear Panel of a Cisco Catalyst 9500 Switch (C9500-12Q, C9500-24Q, C9500-40X and C9500-16X)



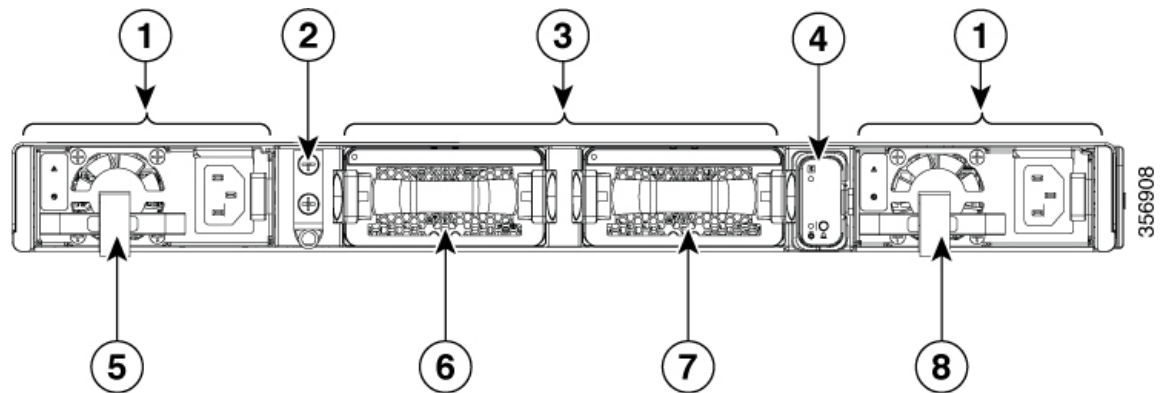
1	Power supply modules	7	Fan 3
2	USB 3.0 host port	8	Fan 2
3	Fan modules	9	Fan 1
4	Grounding pad	10	Fan 0
5	PSU 1	11	PSU 0
6	Fan 4	-	-

Figure 16: Rear Panel of a Cisco Catalyst 9500 High Performance Switch (C9500-32C)



1	Power supply modules	7	Fan 3
2	Fan modules	8	Fan 2
3	Grounding pad	9	Fan 1
4	SATA SSD module	10	Fan 0
5	PSU 1	11	PSU 0
6	Fan 4	-	-

Figure 17: Rear Panel of a Cisco Catalyst 9500 High Performance Switch (C9500-32QC, C9500-48Y4C, and C9500-24Y4C)



1	Power supply modules	5	PSU 1
2	Grounding pad	6	Fan 1
3	Fan modules	7	Fan 0
4	SATA SSD module	8	PSU 0

SATA SSD Module

To support the storage needs on the switch, the Cisco Catalyst 9500 Series High Performance 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 10: Internal Power Supply Modules

Part Number	PSU Modules	Switches Supported
PWR-C4-950WDC-R	950-W DC power supply module	Cisco Catalyst 9500 Series switches: C9500-12Q C9500-24Q C9500-40X C9500-16X
PWR-C4-950WAC-R	950-W AC power supply module	
C9K-PWR-650WAC-R	650-W AC power supply module	Cisco Catalyst 9500 Series High Performance switches: C9500-32QC C9500-48Y4C C9500-24Y4C
C9K-PWR-650WACL-R	650-W AC power supply module	
C9K-PWR-930WDC-R	930-W DC power supply module	
C9K-PWR-1600WAC-R	1600-W AC power supply module	Cisco Catalyst 9500 Series High Performance switch: C9500-32C
C9K-PWR-1600WDC-R	1600-W DC power supply module	



Caution In Europe, you must use C9K-PWR-650WACL-R in a dual-power supply configuration. The use of a single C9K-PWR-650WACL-R in C9500-24Y4C, C9500-48Y4C, or C9500-32QC can result in unpredictable operation and the interruption of the network service. Cisco has no liability for any use of C9K-PWR-650WACL-R that is inconsistent with this document.

Fan Modules

The switch supports field-replaceable, variable-speed modular fans with default front-to-back 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 11: Fan Modules

Part Number	Fan Modules	Switches Supported
FAN-T4-R=	Type 4 front to back cooling fan	Cisco Catalyst 9500 Series switches: C9500-12Q C9500-24Q C9500-40X C9500-16X
C9K-T1-FANTRAY=	Hot-swappable fan tray unit with dual stacked fans.	Cisco Catalyst 9500 Series High Performance switches: C9500-32QC C9500-48Y4C C9500-24Y4C
C9K-T2-FANTRAY=	Type 4 front to back cooling fan	Cisco Catalyst 9500 Series High Performance switch: C9500-32C

For more information, see [Fan Module Overview](#) , on page 80.



CHAPTER 3

Preparing for Installation

- [Safety Warnings, on page 23](#)
- [Site Requirements, on page 25](#)

Safety Warnings



Warning Read the installation instructions before using, installing, or connecting the system to the power source. Statement 1004



Warning Class 1 laser product. Statement 1008



Warning This unit is intended for installation in restricted access areas. A restricted access area can be accessed by skilled, instructed or qualified personnel. Statement 1017



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



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



Warning 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. Statement 1032



Warning Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034



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



Warning This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045



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



Warning To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes. Statement 1074



Warning Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051



Warning 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. Statement 1091



Warning **Statement 1073**—No User-Serviceable Parts
There are no serviceable parts inside. To avoid risk of electric shock, do not open.



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, especially the fan vent on the chassis.
- 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.

- 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).
 - If the ambient intake air temperature exceeds this recommendation, the system may experience minor temperature alarms and increase fan speeds in response.
 - If the ambient intake air temperature equals or is greater than 131°F (55°C), 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

Fans cool power supplies and system components by drawing in room-temperature air and exhausting heated air out through various openings in the chassis. However, fans also ingest dust and other particles, causing contaminant buildup in the system and increased internal chassis temperature. 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.

The standards listed below provide guidelines for acceptable working environments and acceptable levels of suspended particulate matter:

- National Electrical Manufacturers Association (NEMA) Type 1
- International Electrotechnical Commission (IEC) IP-20

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.



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.

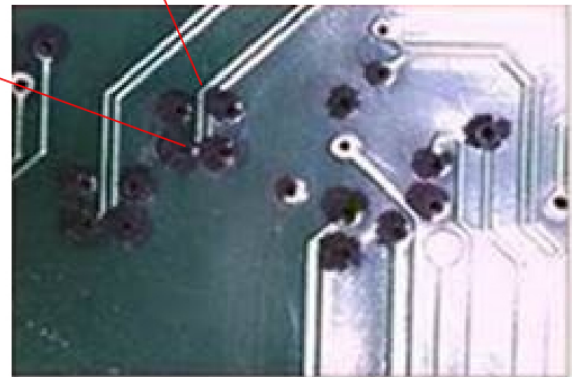
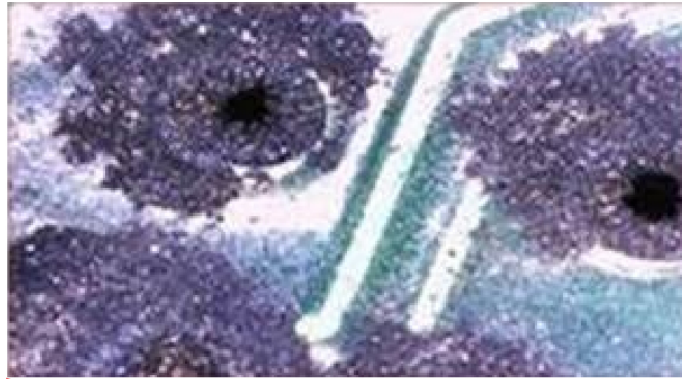
Corrosion

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 18: 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.



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

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.



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.

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.

You must install a system ground as part of the chassis installation process. Chassis installations that rely only on the AC third-prong ground are insufficient to adequately ground the systems.

Proper grounding practices ensure that the buildings and the installed equipment within them have low-impedance connections and low-voltage differentials between chassis. When you install a system ground, you reduce or prevent shock hazards, chances of equipment damage due to transients, and the potential for data corruption.

Without proper and complete system grounding, you run the risk of increased component damage due to ESD. Additionally, you have a greatly increased chance of data corruption, system lockup, and frequent system reboot situations by not using a system ground.



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 12: 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.
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 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 preferred 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 a 6 AWG grounding wire.



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



Note Always ensure that all of the modules are completely installed and that the captive installation screws are fully tightened. In addition, ensure that all the I/O cables and power cords are properly seated. These practices are normal installation practices and must be followed in all installations.

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 35](#)
- [Contents of the Shipping Box, on page 36](#)
- [Spare Accessory Kits, on page 38](#)
- [Unpacking the Switch, on page 39](#)
- [Establishing the System Ground, on page 39](#)
- [Installing the Switch, on page 41](#)

Installation Tasks

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

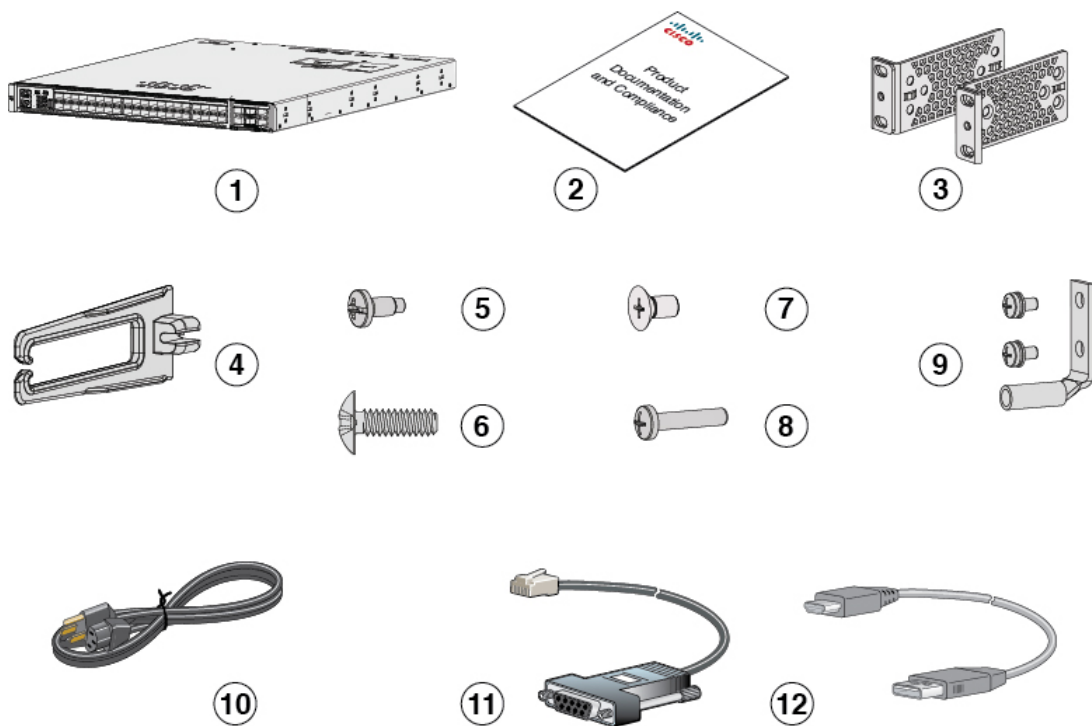
Task	Description
Unpacking the Switch	Remove the switch from the packaging material. Note Save the packaging material for later use if you need to move the chassis.
Installing the Switch	Install the switch.
Connecting the System Ground	Construct and attach a system ground wire from the building (earth)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

Task	Description
Connector and Cable Specifications	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 19: Components Delivered in the Shipping Box of Cisco Catalyst 9500 Series Switches

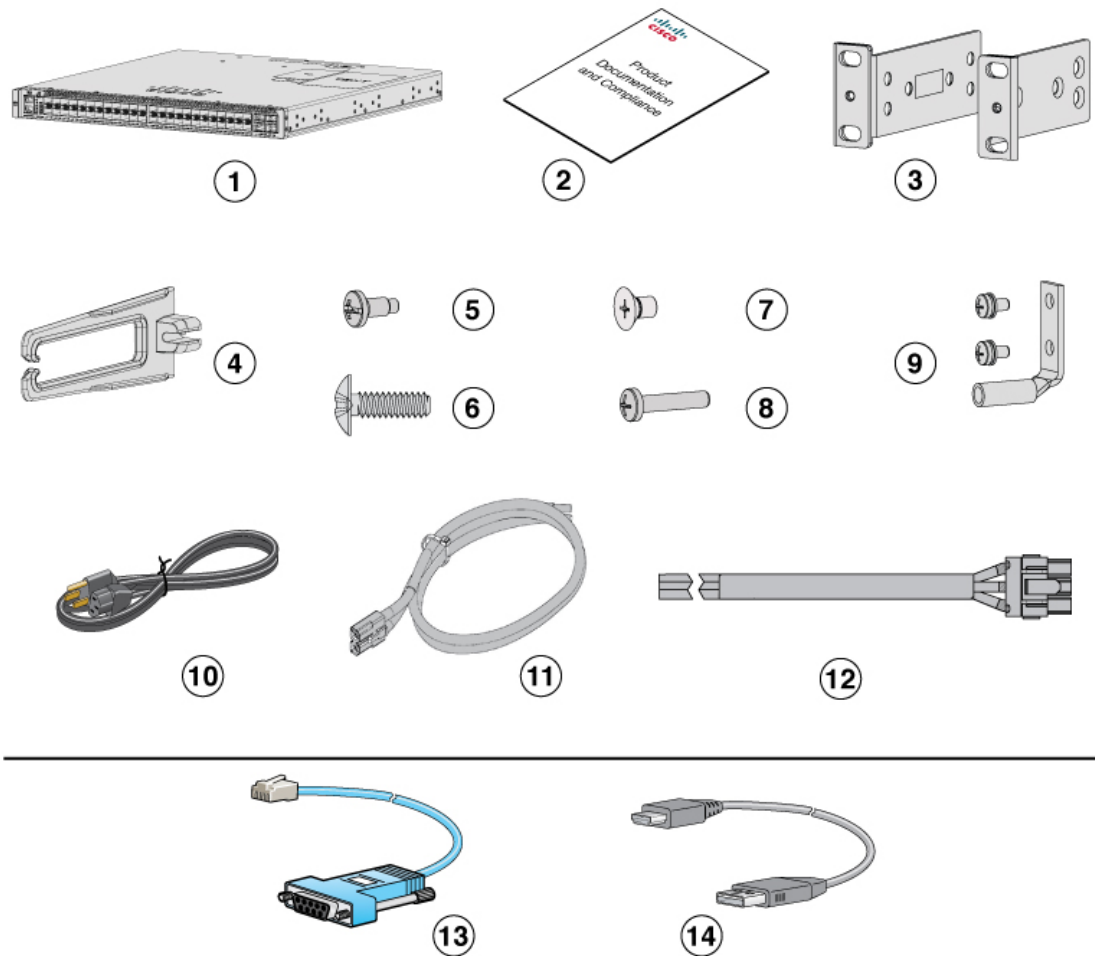


1	Cisco Catalyst 9500 Series switch with optional network module ¹ (power supply and fan modules not shown)	7	Eight number-8 Phillips flat-head 0.312" long screws
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356731

2	Product documentation and compliance document	8	Two M4.0 x 20mm Phillips pan-head screws (Black color)
3	Two 19-inch mounting brackets	9	Ground lug and two M4.0 x 8mm Phillips pan-head screws
4	Two Cable guides	10	(Optional) AC power cord ²
5	Four number-12 pan-head 0.50" long screws	11	(Optional) RJ-45 console cable ¹
6	Four number-10 pan-head 0.625" long screws	12	(Optional) USB console cable ¹

Figure 20: Components Delivered in the Shipping Box of Cisco Catalyst 9500 Series High Performance Switches



356709

1	Cisco Catalyst 9500 Series High Performance switch with optional network module ¹ (power supply and fan modules not shown)	8	Two M4.0 x 20mm Phillips pan-head screws (Black color)
2	Product documentation and compliance document	9	Ground lug and two M4.0 x 8mm Phillips pan-head screws
3	Two 19-inch mounting brackets	10	(Optional) AC power cord ²
4	Cable guide	11	(Optional) DC power cord for Cisco Catalyst 9500 High Performance C9500-32C switch model. ¹
5	Four number-12 pan-head 0.50" long screws	12	(Optional) DC power cord for Cisco Catalyst 9500 High Performance C9500-32QC, C9500-48Y4C, and C9500-24Y4C switch models. ¹
6	Four number-10 pan-head 0.625" long screws	13	(Optional) RJ-45 console cable ¹
7	12 M4.0 x 6mm Phillips flat-head screws	14	(Optional) USB console cable ¹



- 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 13: Spare Accessory Kits and Rack Mount Kits for Cisco Catalyst 9500 Series Switches

Part Number	Description	Switches Supported
C9500-ACCKITH-19I=	19" rack mount accessory kit for Cisco Catalyst 9500 Series High Performance switches.	Cisco Catalyst 9500 Series High Performance switches: C9500-32C
C9500-ACCKITH-23I=	23" rack mount accessory kit for Cisco Catalyst 9500 Series High Performance switches.	C9500-32QC C9500-48Y4C
C9500-4PTH-KIT=	Extension rails and brackets for four-point mounting for Cisco Catalyst 9500 Series High Performance switches.	C9500-24Y4C

Part Number	Description	Switches Supported
C9500-ACC-KIT-19I=	19" rack mount accessory kit for Cisco Catalyst 9500 Series switches.	Cisco Catalyst 9500 Series switches: C9500-12Q
C9500-ACC-KIT-23I=	23" rack mount accessory kit for Cisco Catalyst 9500 Series switches.	C9500-24Q C9500-40X
C9500-4PT-KIT=	Extension rails and brackets for four-point mounting for Cisco Catalyst 9500 Series switches.	C9500-16X

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.



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.

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.



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.



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.

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 8mm 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 1600W power supply module require an 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.

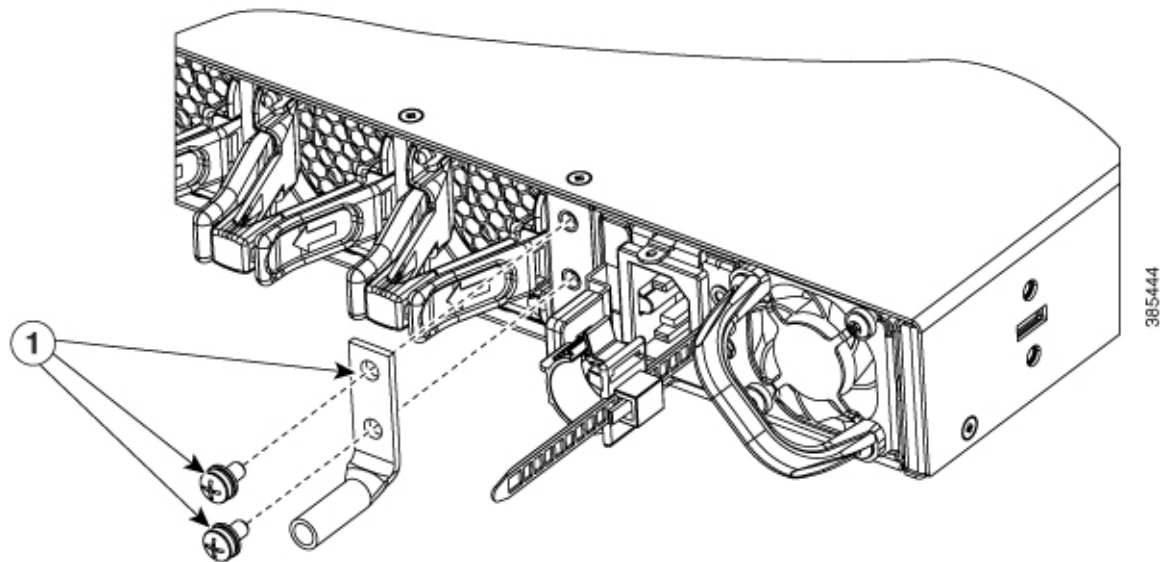
Connecting the System Ground

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.
- 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 lug to the chassis with two M4.0 x 8mm Phillips pan-head screws.

Figure 21: Connecting the System Ground



1	Ground lug and two M4.0x8mm Phillips pan-head screws
---	--

- 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 25.14 inches and 35.84 inches for C9500-24Q, C9500-12Q, C9500-40X and C9500-16X.

- between 26.68 inches and 42.63 inches for C9500-32C.
- between 23.48 inches and 39.43 inches for C9500-32QC, C9500-48Y4C AND C9500-24Y4C.
- 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.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Statement 1006

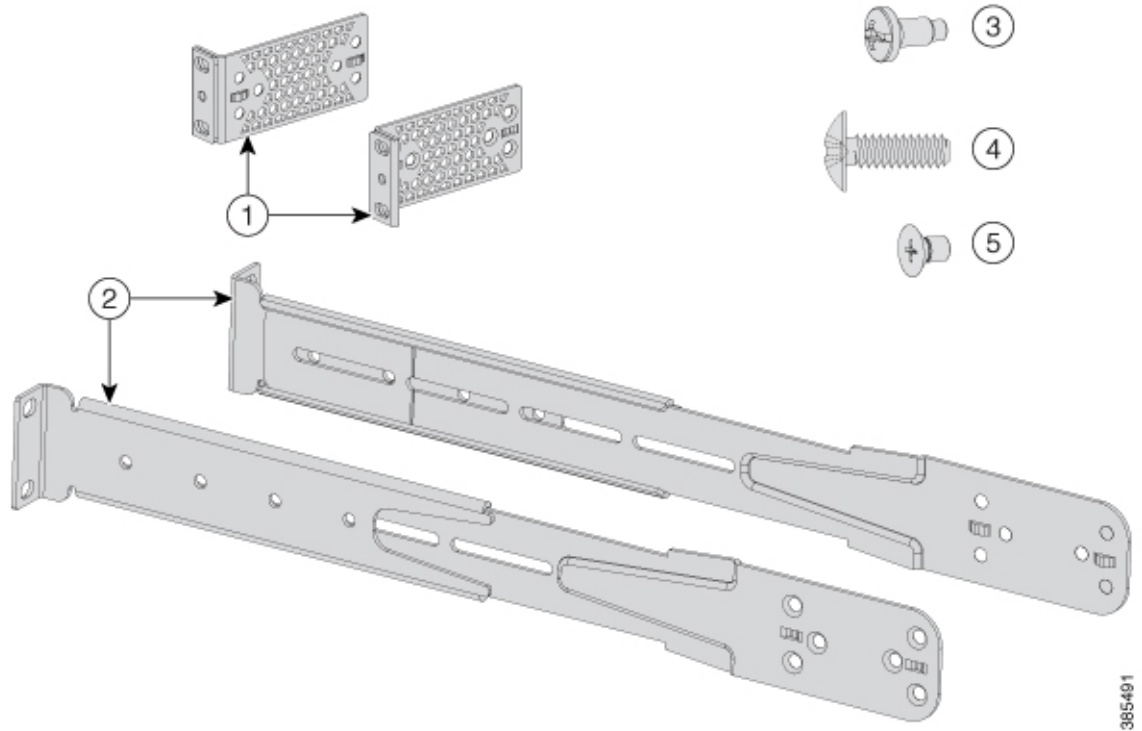
**Warning**

To reduce risk of electric shock and fire, take care when connecting units to the supply circuit so that wiring is not overloaded.

Statement 1018

Figure 22: Four Post Rack Mount Kit for Cisco Catalyst 9500 Series Switches

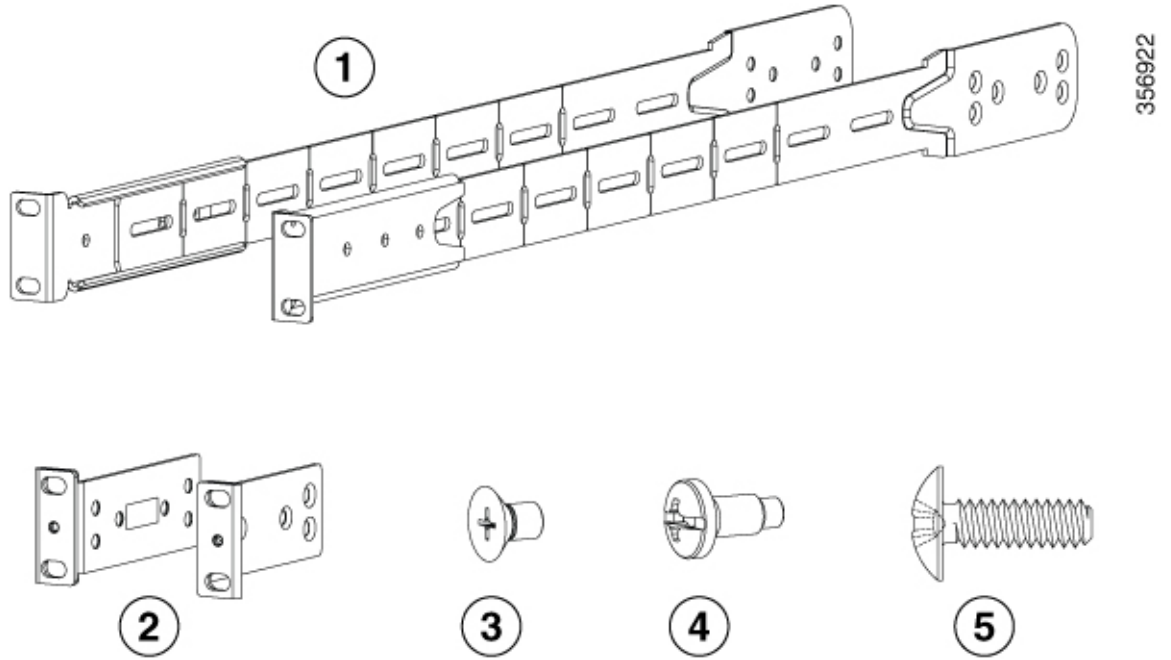
This figure shows the four post rack mount kit for Cisco Catalyst 9500 Series Switches. You can order the optional brackets from your Cisco sales representative.



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	16 number-8 Phillips flat-head 0.312" long screws
3	Eight number-12 Phillips pan-head 0.50" long screws	-	-

Figure 23: Four Post Rack Mount Kit for Cisco Catalyst 9500 High Performance Series Switches

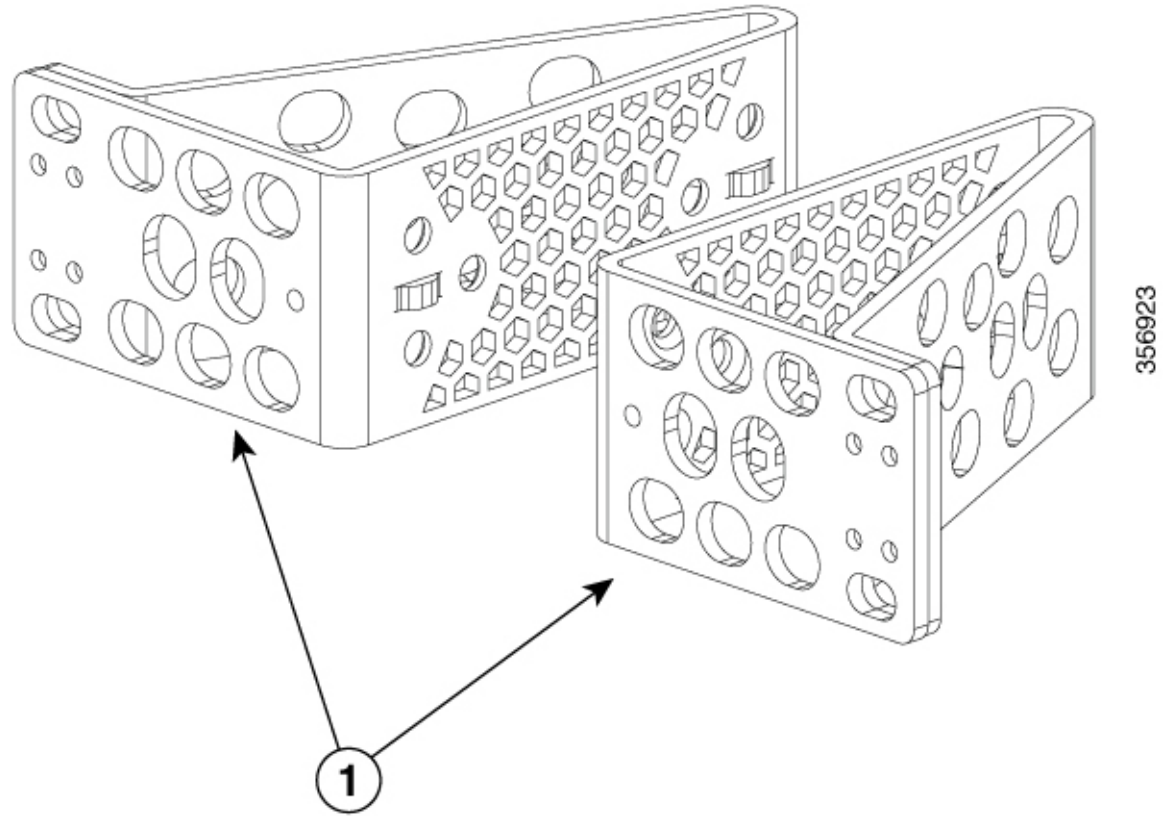
This figure shows the four post rack mount kit for Cisco Catalyst 9500 High Performance Series Switches. You can order the optional brackets from your Cisco sales representative.



1	Extension rails and brackets for four-point mounting	4	Eight number-12 Phillips pan-head 0.50" long screws
2	Two 19-inch brackets	5	Eight number-10 Phillips pan-head 0.625" long screws
3	24 M4.0x6mm Phillips flat-head screws	-	-

Figure 24: 23-inch Rack Mount Kit for Cisco Catalyst 9500 Series Switches

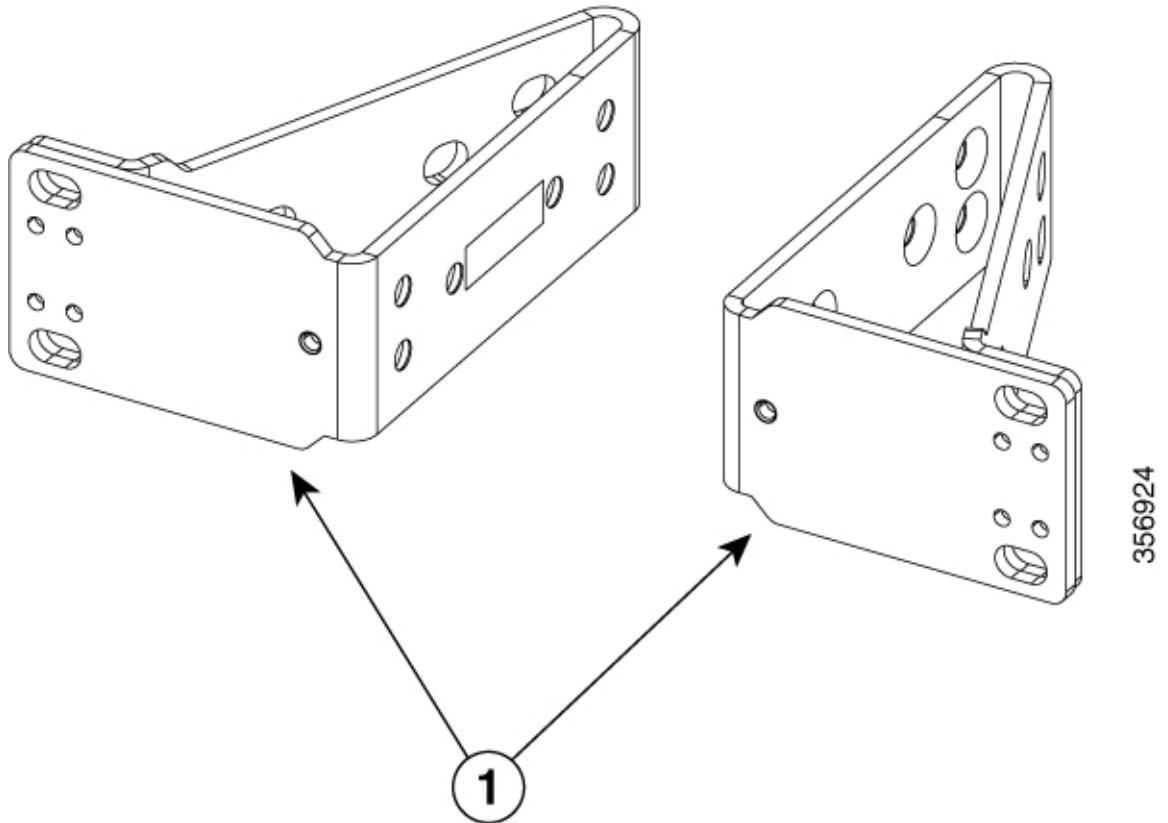
This figure shows the optional 23-inch rack mount kit for Cisco Catalyst 9500 Series Switches. You can order the kit from your Cisco sales representative.



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

Figure 25: 23-inch Rack Mount Kit for Cisco Catalyst 9500 High Performance Series Switches

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



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

Attaching the Rack-Mount Brackets

Procedure

Attach the rack-mount brackets to the switch.

For Cisco Catalyst 9500 Series Switches, use number-8 Phillips flat-head 0.312" long screws to attach the long side of the bracket to each side of the switch for the front, middle or rear mounting positions.

Figure 26: Front Mounting position of Rack Mounting Brackets

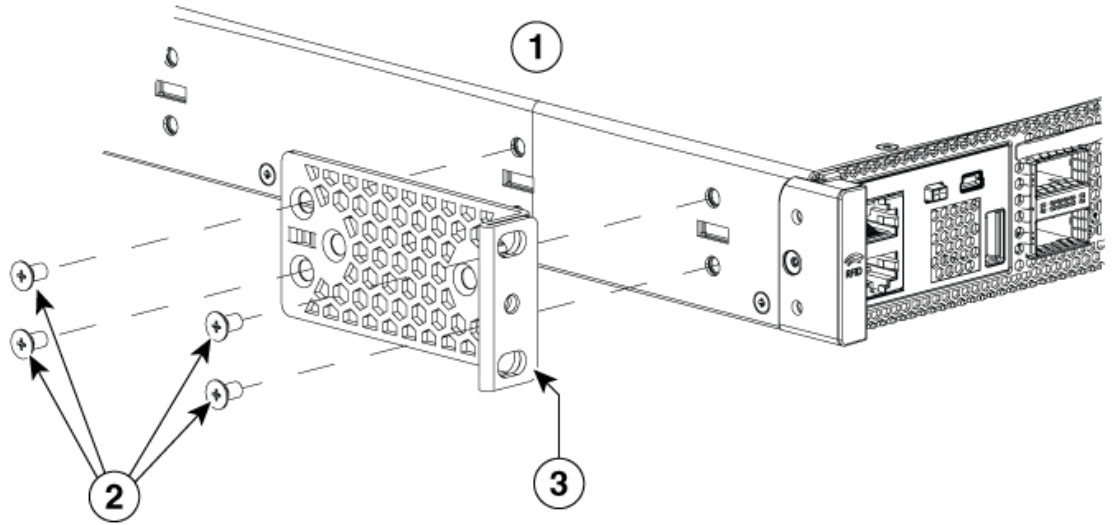


Figure 27: Middle Mounting position of Rack Mounting Brackets

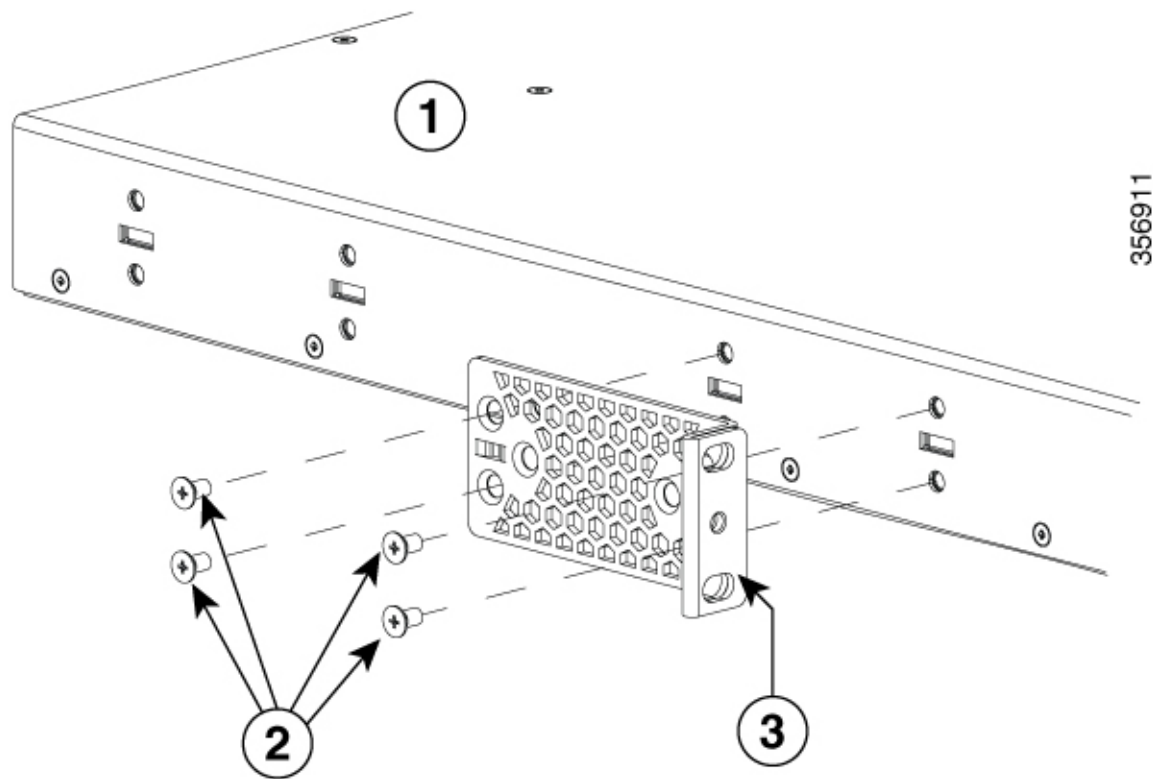
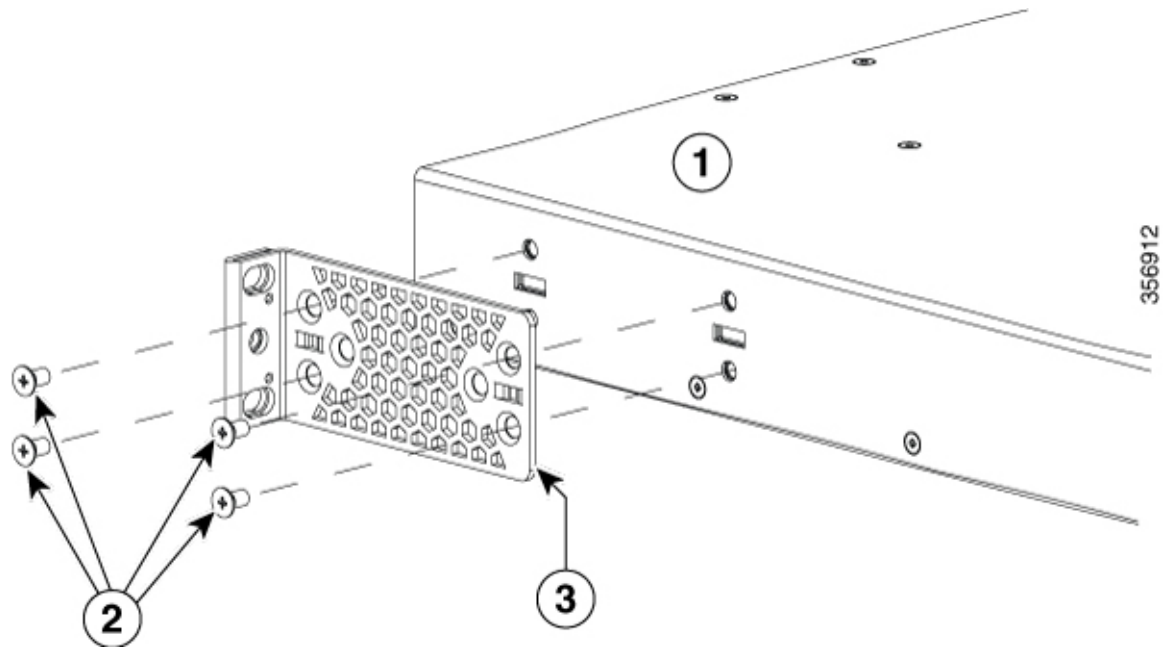


Figure 28: Rear Mounting position of Rack Mounting Brackets



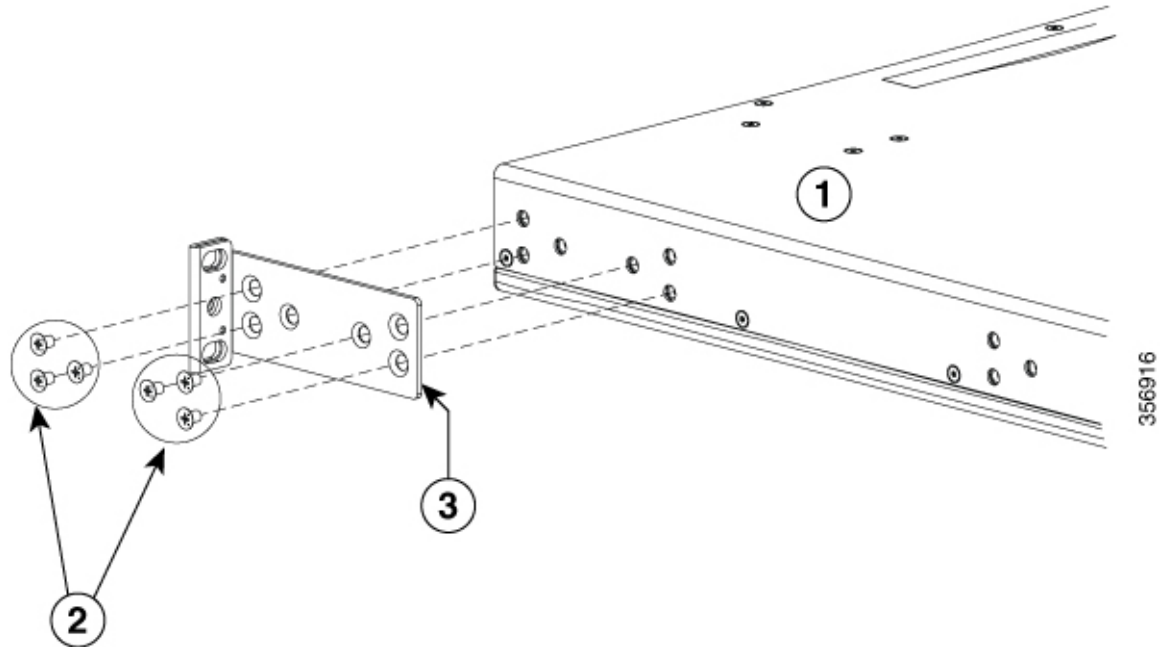
1	Cisco Catalyst 9500 Series switch	3	19-inch mounting brackets
2	Number-8 Phillips flat-head 0.312" long screws	-	-

For Cisco Catalyst 9500 High Performance Series Switches, 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 29: Front Mounting position of Rack Mounting Brackets

The following illustrations used are of a Cisco Catalyst 9500 High Performance Series Switch. Note that the number of screws used for 9500 High Performance Series Switches are different from Cisco Catalyst 9500 Series Switch. Cisco Catalyst 9500 High Performance Series Switches use 6 screws to install the bracket on

Figure 31: Rear Mounting position of Rack Mounting Brackets



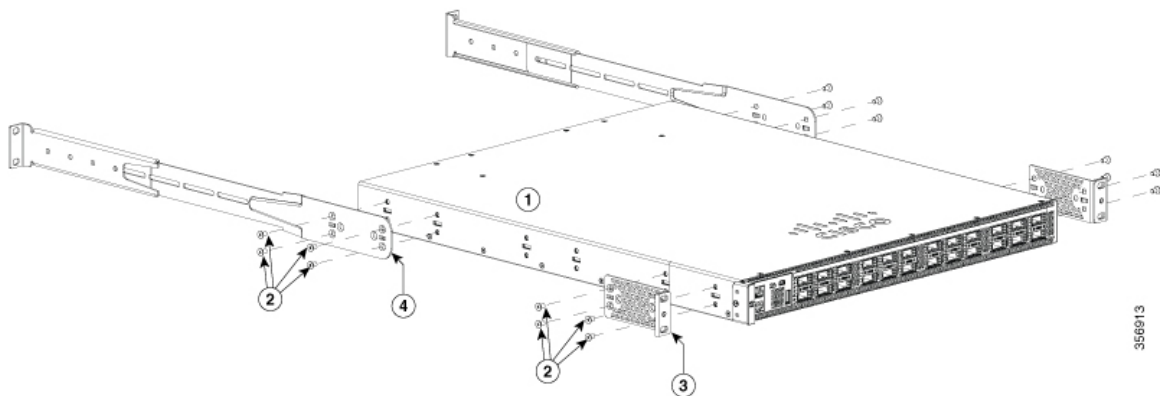
1	Cisco Catalyst 9500 Series High Performance switch	3	19-inch mounting brackets
2	M4.0x6mm Phillips flat-head screws	-	-

Mounting the Switch in a Rack

Procedure

Step 1 Use the Phillips machine screws to attach the brackets and the extension rail to the switch.

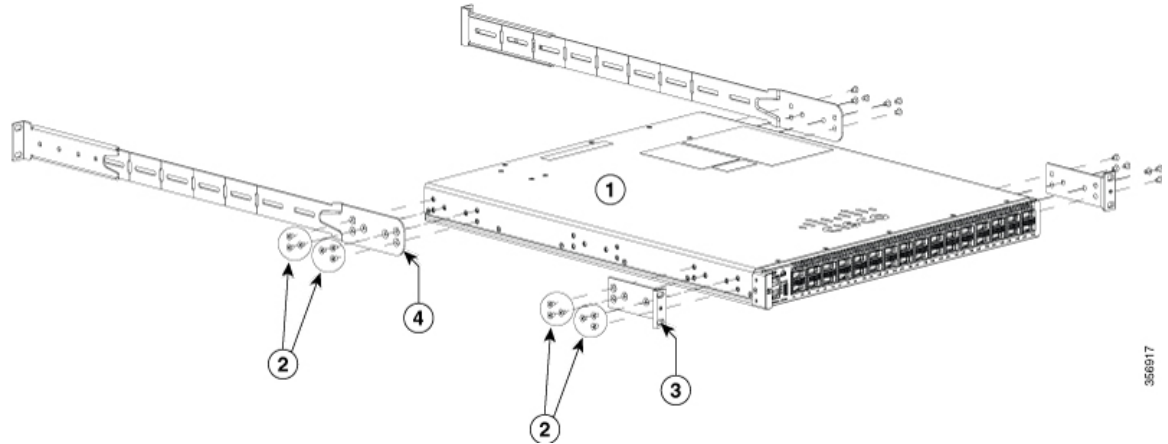
Figure 32: Attaching the Extension Rail on a Cisco Catalyst 9500 Series Switch



1	Cisco Catalyst 9500 Series switch	3	19-inch mounting brackets
2	Number-8 Phillips flat-head 0.312" long screws	4	Extension rails and - - brackets

Figure 33: Attaching the Extension Rail on a Cisco Catalyst 9500 High Performance Series Switch

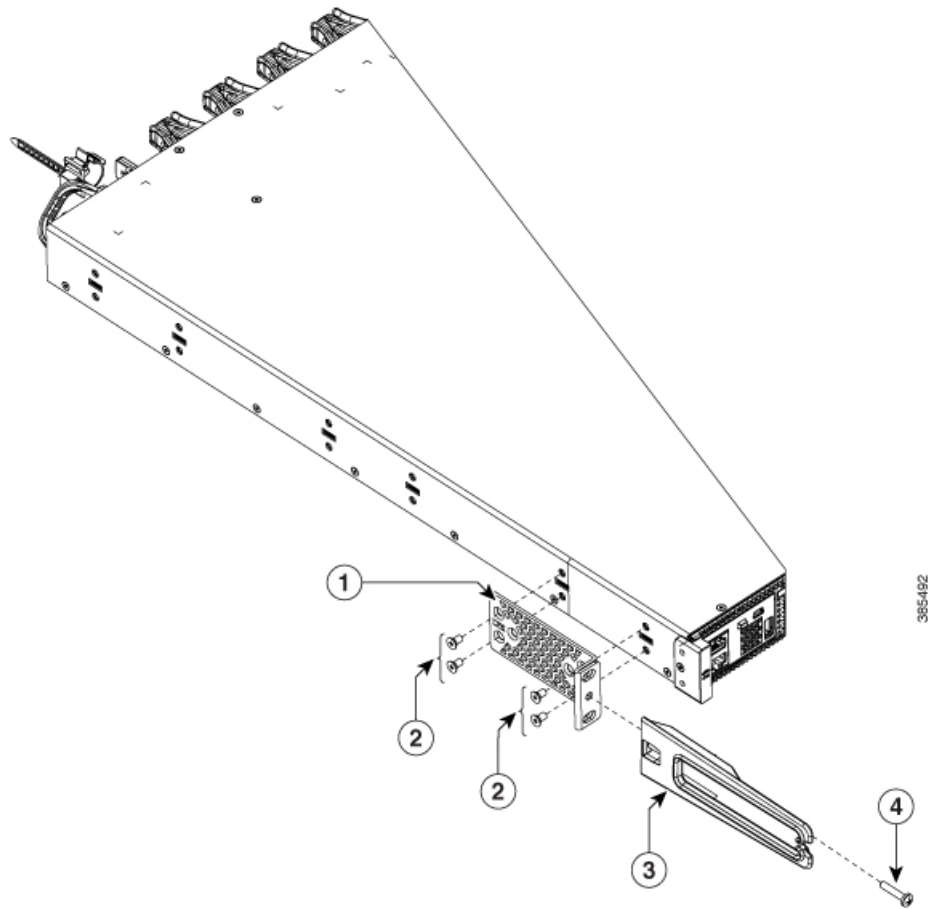
Method to attach the extension rail on Cisco Catalyst 9500H Series Switches and Cisco Catalyst 9500 Series switches is similar. The only difference is that a C9500 switch uses 4 screws to attach the extension rail on to one side of the switch, whereas a C9500H switch uses 6 screws.



1	Cisco Catalyst 9500 Series High Performance switch	3	19-inch mounting brackets
2	M4.0x6mm Phillips flat-head screws	4	Extension rails and brackets

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

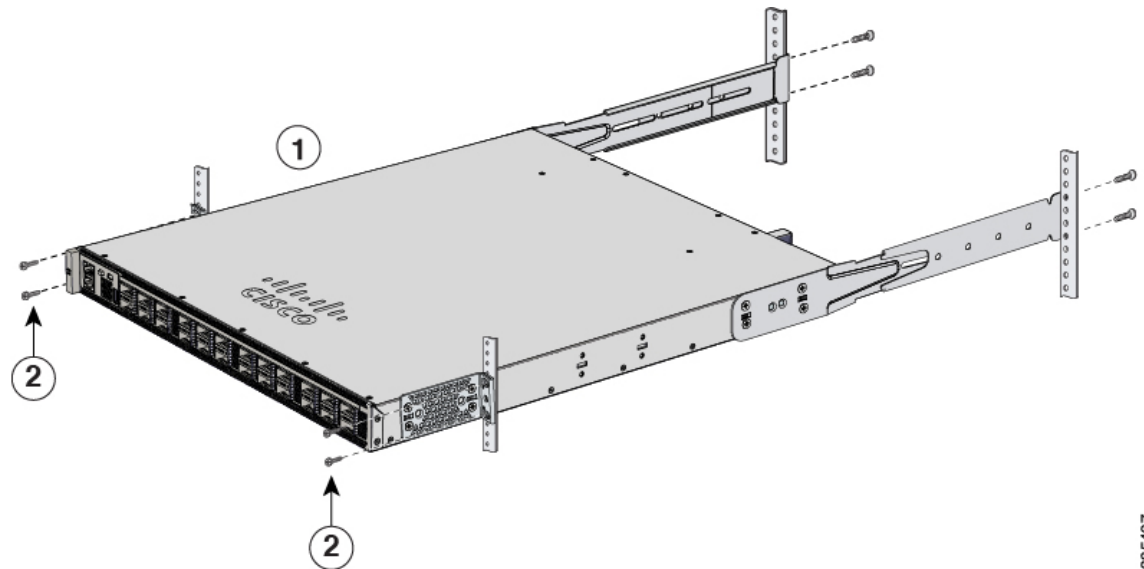
Figure 34: Attaching the Cable Guide



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

Step 3 Secure the switch to the rack rails using the Number-12 or number-10 Phillips machine screws provided with the accessory kit.

Figure 35: Mounting the Switch in a Rack



385497

1	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

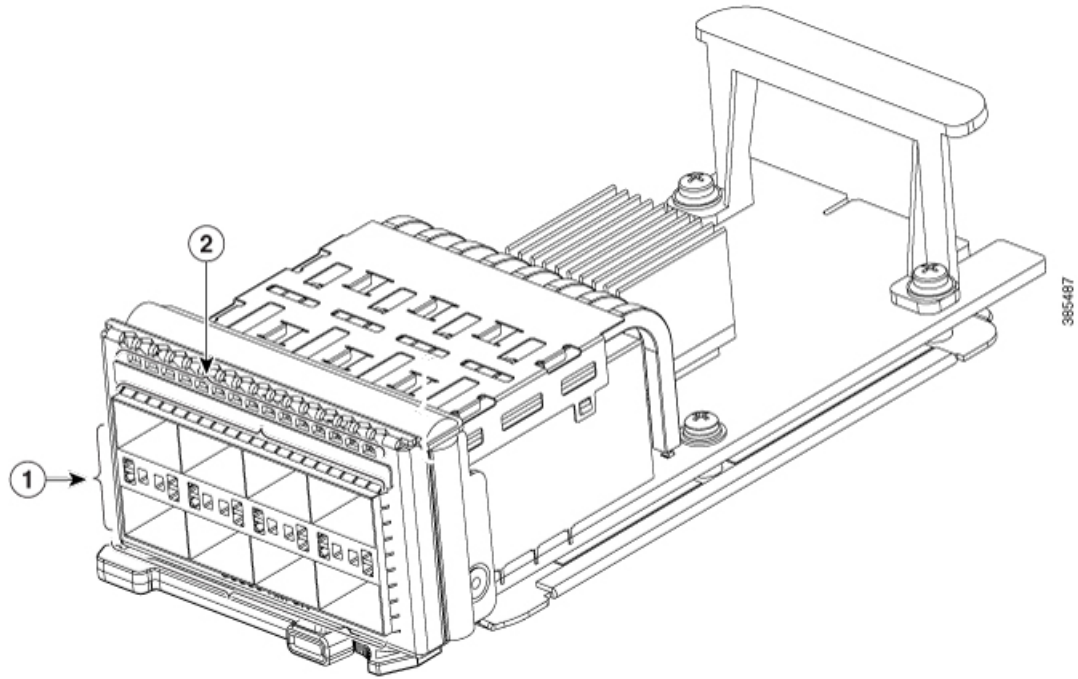
Installing a Network Module

- [Network Module Overview, on page 55](#)
- [Installing a Network Module in the Switch, on page 57](#)
- [Removing a Network Module, on page 59](#)
- [Finding the Network Module Serial Number, on page 60](#)

Network Module Overview

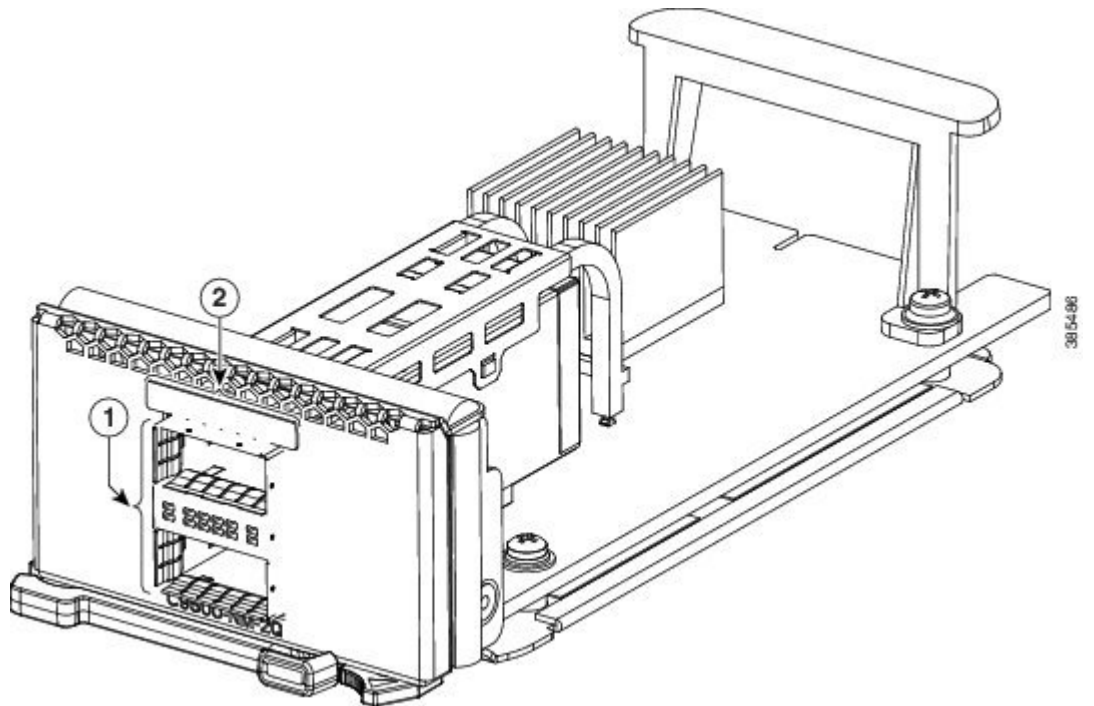
Network Module	Description
C9500-NM-8X	<p>This module has eight 10G SFP module ports. Any combination of standard SFP modules are supported.</p> <p>Note This is supported on the following switch models:</p> <ul style="list-style-type: none">• C9500-16X• C9500-40X
C9500-NM-2Q	<p>This module has two 40G QSFP module ports. Any combination of standard QSFP modules are supported.</p> <p>Note This is supported on the following switch models:</p> <ul style="list-style-type: none">• C9500-16X• C9500-40X
Blank Network Module (NM-C4-10G-BLANK)	<p>Insert this blank module when the switch has no uplink ports (this is required for sufficient air flow).</p>

Figure 36: C9500-NM-8X Network Module



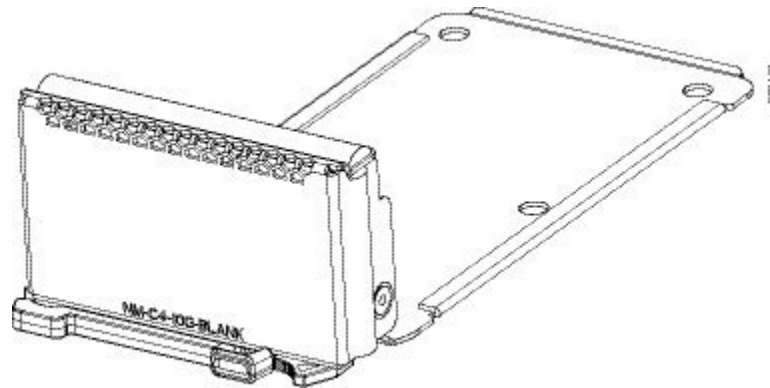
1	SFP module ports	2	LEDs
---	------------------	---	------

Figure 37: C9500-NM-2Q Network Module



1	QSFP module ports	2	LEDs
---	-------------------	---	------

Figure 38: Blank Network Module



Installing a Network Module in the Switch

Installing a Network Module



Note The switch can operate without a network module, but a blank module (with no ports or SFP slots) is available and should be installed when uplink ports are not required.



Note The switch generates logs when you insert or remove a network module with SFP/SFP+/SFP28 slots.

Use only supported network modules and SFP/SFP+/SFP28/QSFP modules. Each module has an internal serial EEPROM that is encoded with security information.

The network module is hot-swappable. If you remove a module, replace it with another network module or a blank module.



Note The switch complies with EMC, safety, and thermal specifications when a network module is present. If no uplink ports are required, install a blank network module.

Before you begin

When installing network modules, observe these precautions:

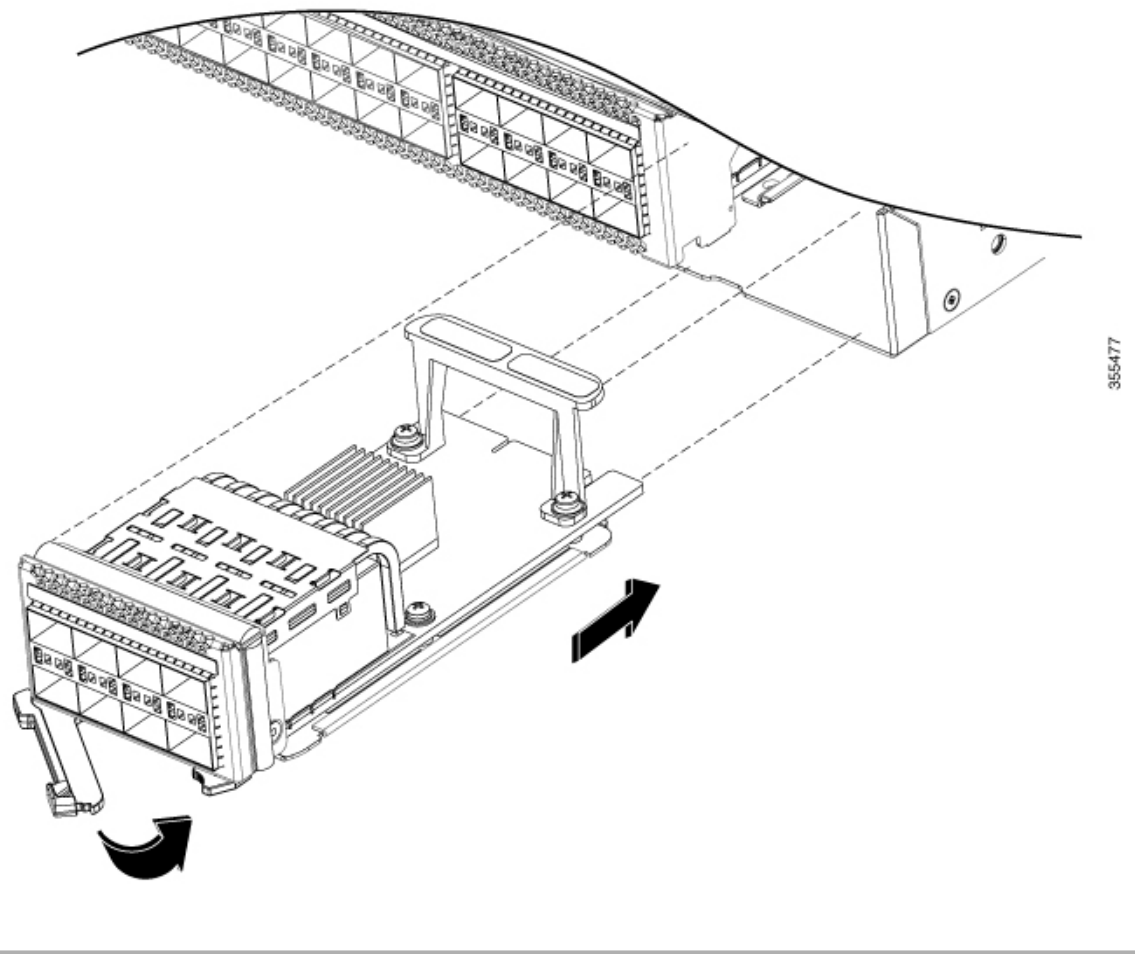
- Do not remove the blank module from the slot unless you are installing an SFP/SFP+/SFP28/QSFP module. Either a module or a dust plug must be in the slot at all times.

- Do not remove the dust plugs from the fiber-optic SFP/SFP+/SFP28/QSFP modules or the rubber caps from the fiber-optic cable until you connect the cable. The plugs and caps protect the module ports and cables from contamination and ambient light.
- Removing and installing a network module can shorten its useful life. Do not remove and insert a network module more often than is necessary.
- To prevent ESD damage, follow your normal board and component handling procedures when connecting cables to the switch and other devices.

Procedure

- Step 1** Attach an ESD-preventive wrist strap to your wrist and to an earth ground surface.
- Step 2** Remove the module from the protective packaging.
- Step 3** Remove the blank module from the switch and save it.
- Caution** Verify the correct orientation of your module before installing it. Incorrect installation can damage the module.
- Caution** Do not install the network module with connected cables or installed SFP/SFP+/SFP28 modules. Always remove any cables and modules before you install the network module.
- Caution** A module interface might become error-disabled when a network module with connected fiber-optic cables is installed or removed. If an interface is error-disabled, you can reenable the interface by using the **shutdown** and **no shutdown** interface configuration commands.
- Step 4** Position the module face up to install it in the module slot. Slide the module into the slot until the back of the module faceplate is flush with the switch faceplate. Secure the network module in place by latch.

Figure 39: Installing the Network Module in the Switch



Removing a Network Module



Note The switch complies with EMC, safety, and thermal specifications when a network module is present. If no uplink ports are required, install a blank network module.



Note To avoid authentication failure and non-detection of modules, wait for a minimum of 6-8 seconds between the online insertion and removal (OIR) of network modules.

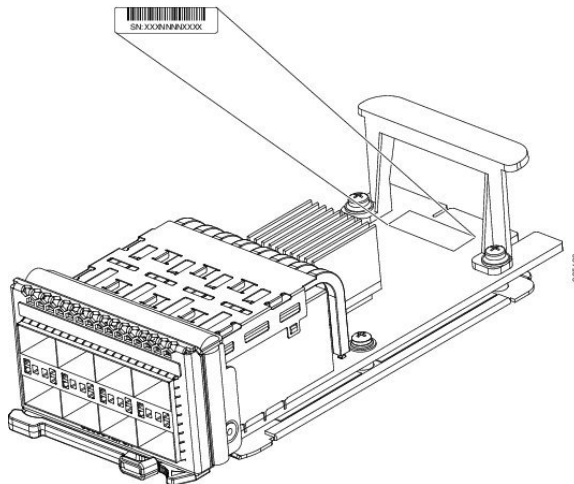
Procedure

-
- Step 1** Attach an ESD-preventive wrist strap to your wrist and to an earth ground surface
- Caution** Do not remove the network module with connected cables or installed pluggable transceiver modules. Always remove any cables and modules before you remove the network module.
- Caution** A module interface might become error-disabled when a network module with connected fiber-optic cables is installed or removed. If an interface is error-disabled, you can reenble the interface by using the **shutdown** and **no shutdown** interface configuration commands.
- Step 2** Disconnect the cables from the pluggable transceiver module.
- Step 3**
- Step 4** Release latch and carefully slide the network module out of the slot.
- Step 5** Install a replacement network module or a blank module in the slot.
- Step 6** Place the module that you removed in an antistatic bag or other protective environment.
-

Finding the Network Module Serial Number

If you contact Cisco Technical Assistance regarding a network module, you need to know its serial number.

Figure 40: Network Module Serial Number Location





CHAPTER 6

Installing Field Replaceable Units

- [Installing a Power Supply](#) , on page 61
- [Installing a Fan Module](#), on page 80
- [Installing an SSD Module](#), on page 87

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)



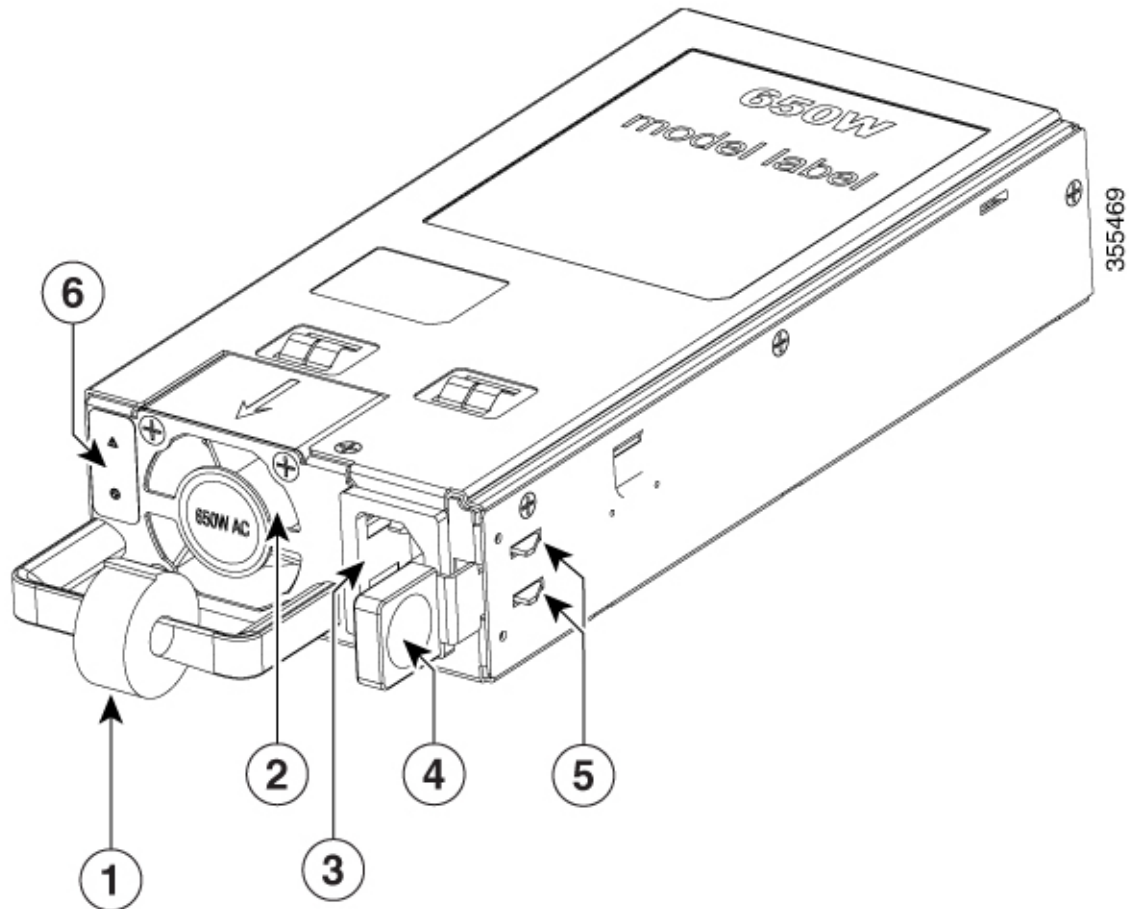
Note If you leave any power supply slots empty, you must ensure that the blank cover (Part Numbers PWR-C4-BLANK, C9K-PWR-C4-BLANK, C9K-PWR-C5-BLANK and PWR-C6-BLANK) is installed in that slot to maintain the designed airflow.

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 21.

Part Number	Description
C9K-PWR-650WAC-R	650W AC Power Supply
C9K-PWR-650WACL-R	650W AC Power Supply
PWR-C4-950WAC-R	950W AC Power Supply
C9K-PWR-1600WAC-R	1600W AC Power Supply
C9K-PWR-930WDC-R	930W DC Power Supply
C9-PWR-950WDC-R	950W DC Power Supply

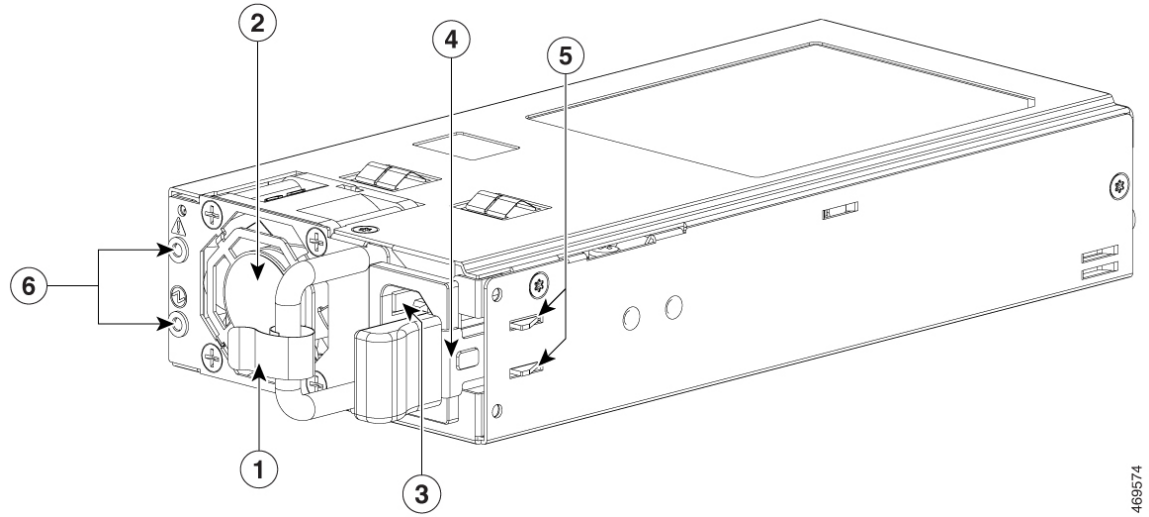
Part Number	Description
C9K-PWR-1600WDC-R	1600W DC Power Supply

Figure 41: Cisco Catalyst 650W AC Input Power Supply (C9K-PWR-650WAC-R)



1	Velcro strap	4	Release latch
2	PSU fan	5	Retainer clips
3	AC power cord connector	6	Power status and power supply failure LEDs

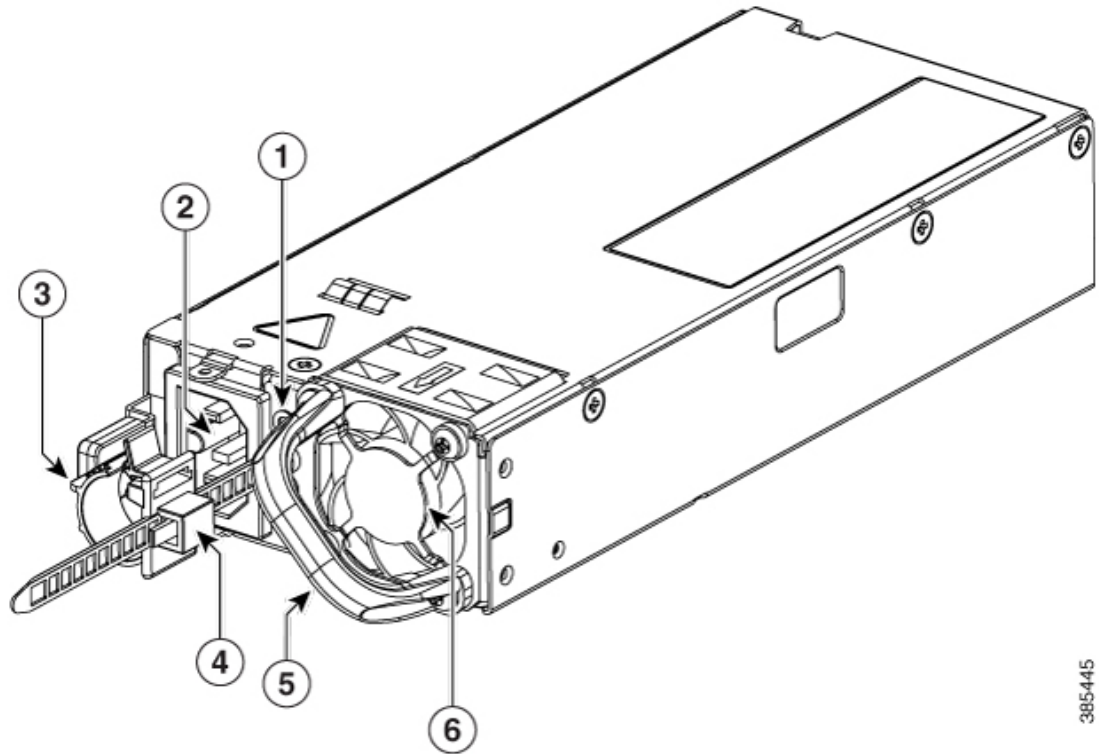
Figure 42: Cisco Catalyst 650W AC Input Power Supply (C9K-PWR-650WACL-R)



468574

1	Velcro strap	4	Release latch
2	PSU fan	5	Retainer clips
3	AC power cord connector	6	Power status and power supply failure LEDs

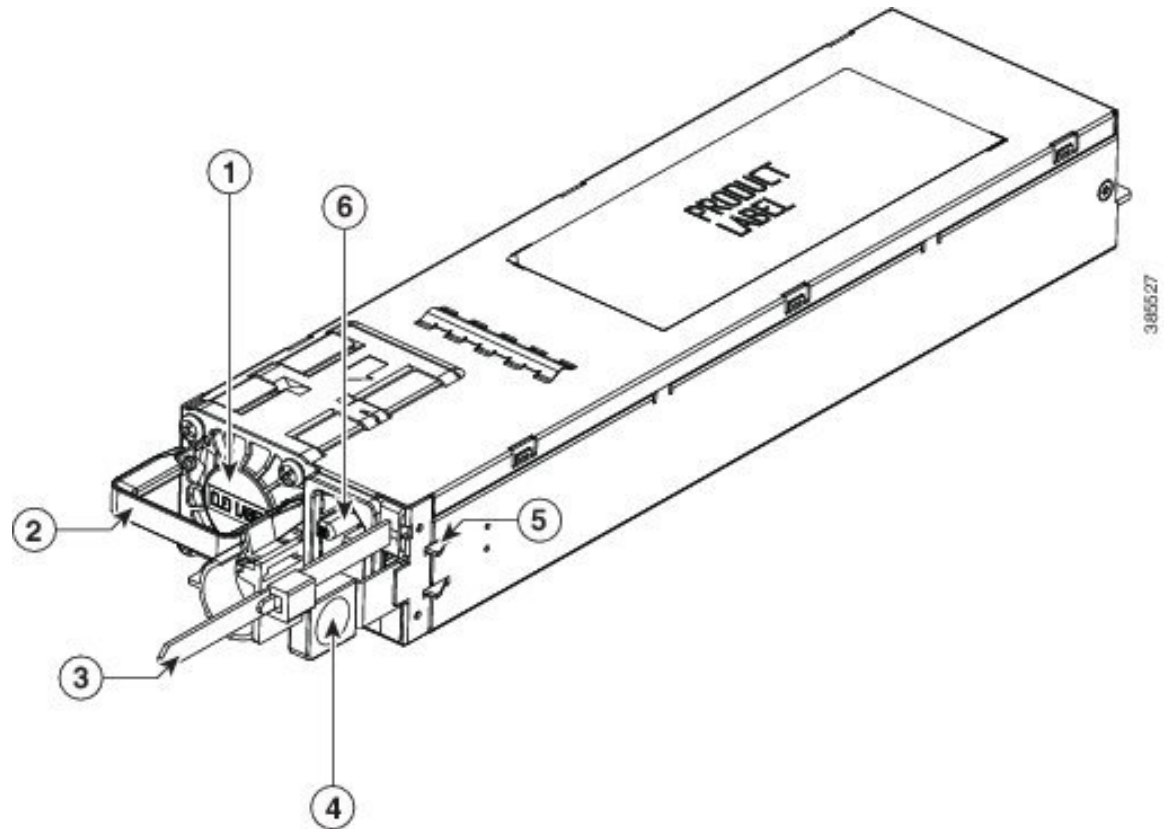
Figure 43: Cisco Catalyst 950W AC Input Power Supply



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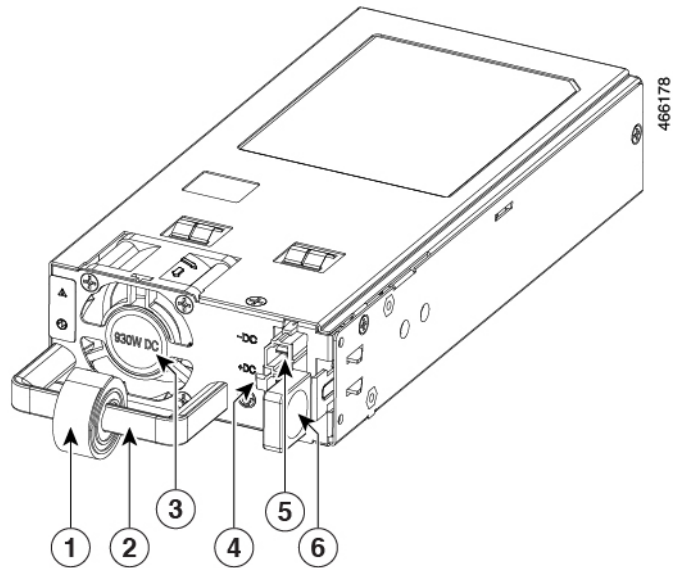
1	PSU LED	4	Power cord retainer
2	AC input connector	5	Release handle
3	Release latch	6	PSU fan

Figure 44: Cisco Catalyst 1600W AC Input Power Supply



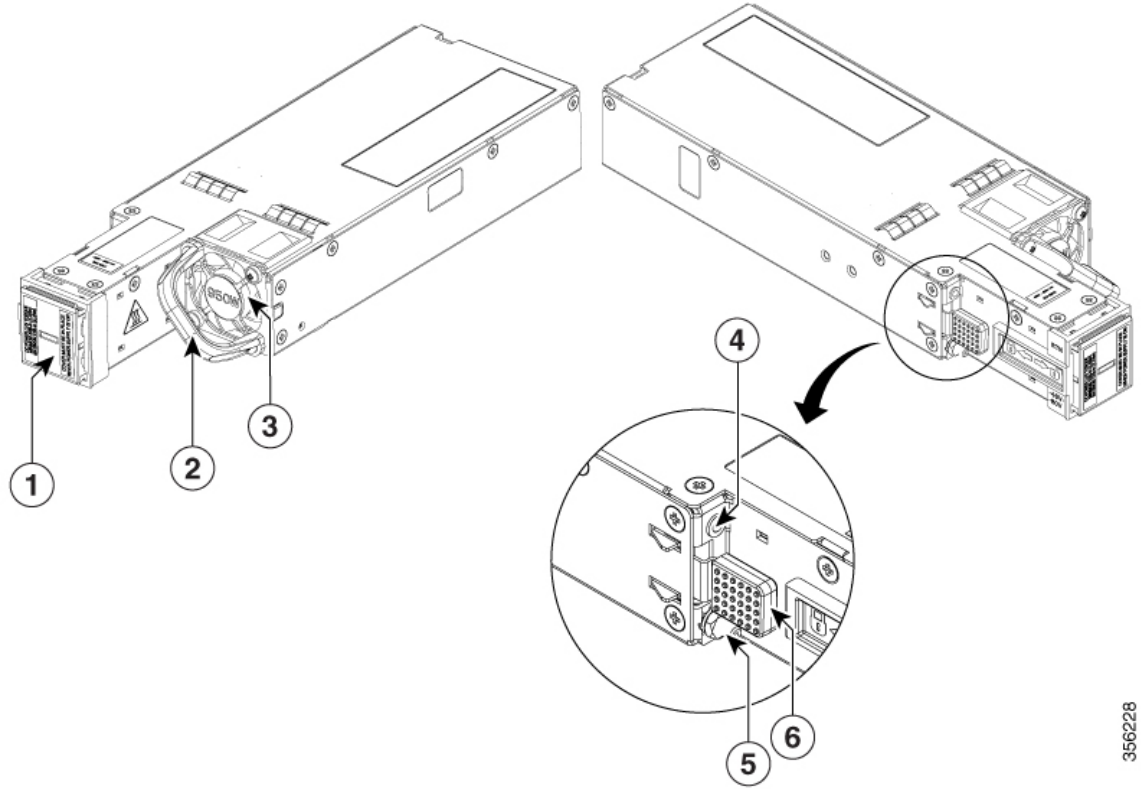
1	PSU fan	4	Release latch
2	Release handle	5	Retainer clips
3	Cable tie	6	AC input connector

Figure 45: Cisco Catalyst 930W DC Input Power Supply



1	Power cord retainer	4	DC+ connector
2	Release handle	5	DC- connector
3	PSU fan	6	Release latch

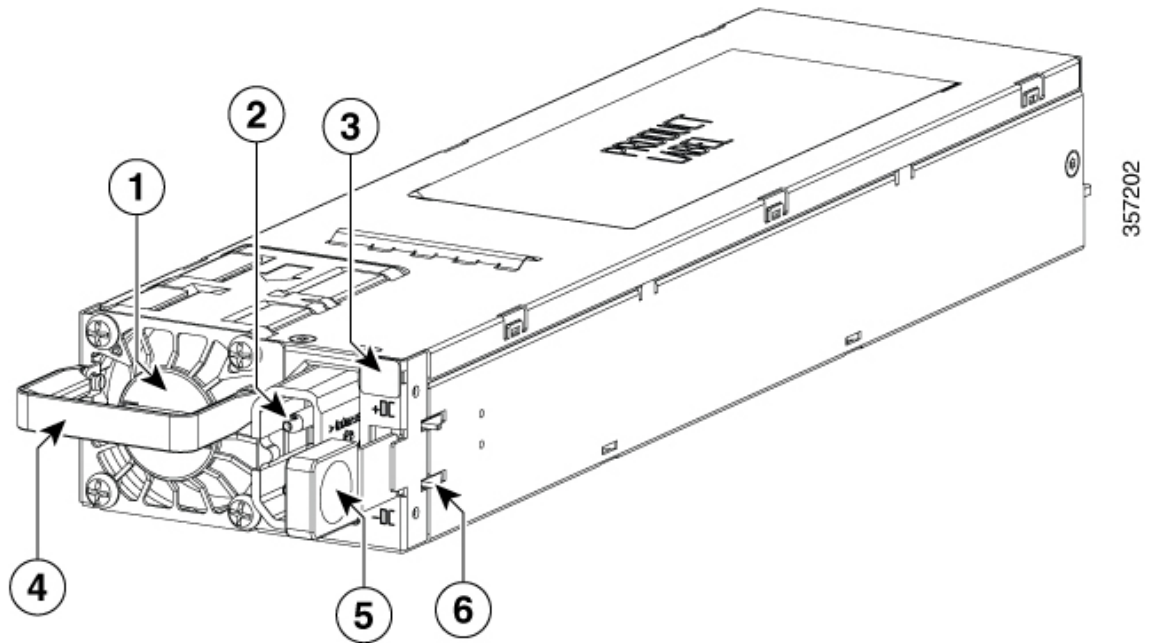
Figure 46: Cisco Catalyst 950W DC Input Power Supply



356228

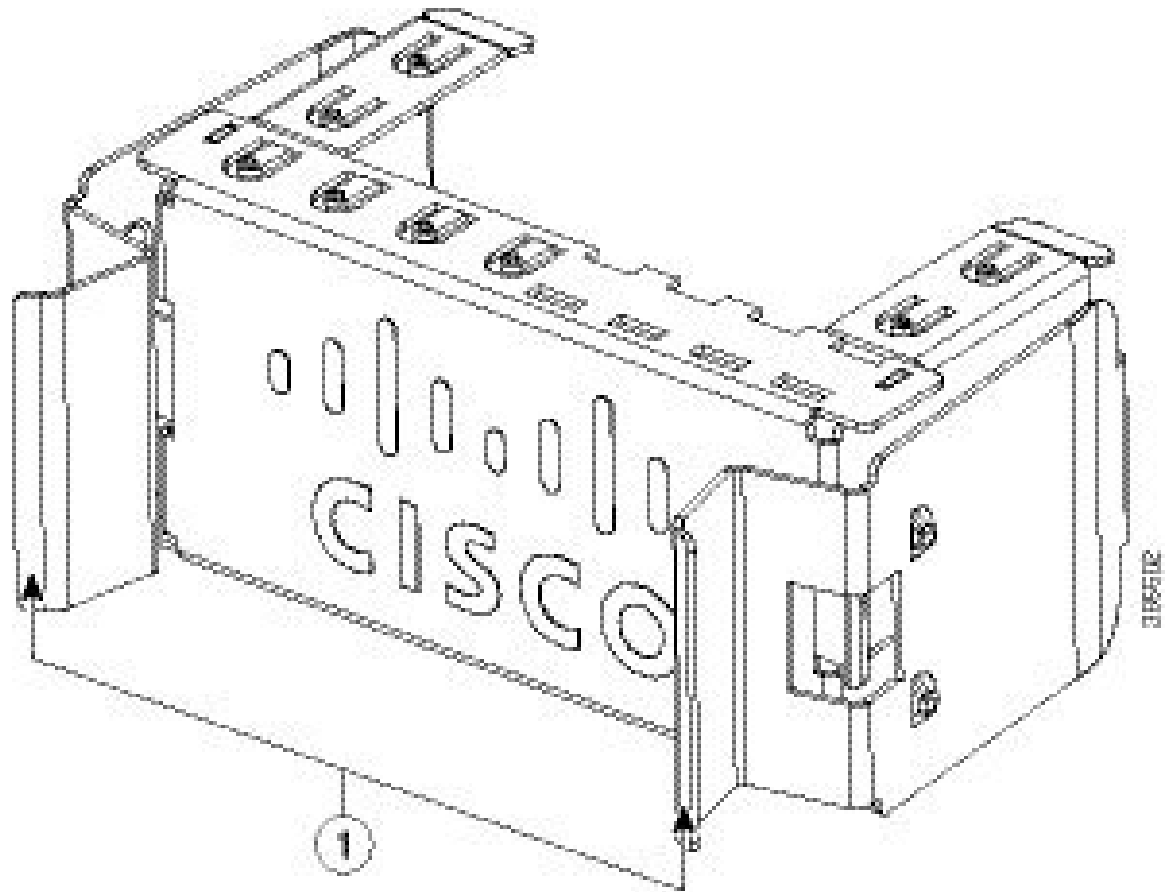
1	DC input connector	4	PSU LED
2	Release handle	5	Grounding terminal
3	PSU fan	6	Release latch

Figure 47: Cisco Catalyst 1600W DC Input Power Supply



1	PSU fan	4	Release handle
2	DC input connector	5	Release latch
3	PSU LED	6	Retainer clips

Figure 48: Power Supply Slot Cover for Cisco Catalyst 9500 Series Switches



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

Figure 49: Power Supply Slot Cover for Cisco Catalyst 9500 High Performance C9500-32C Switch Model

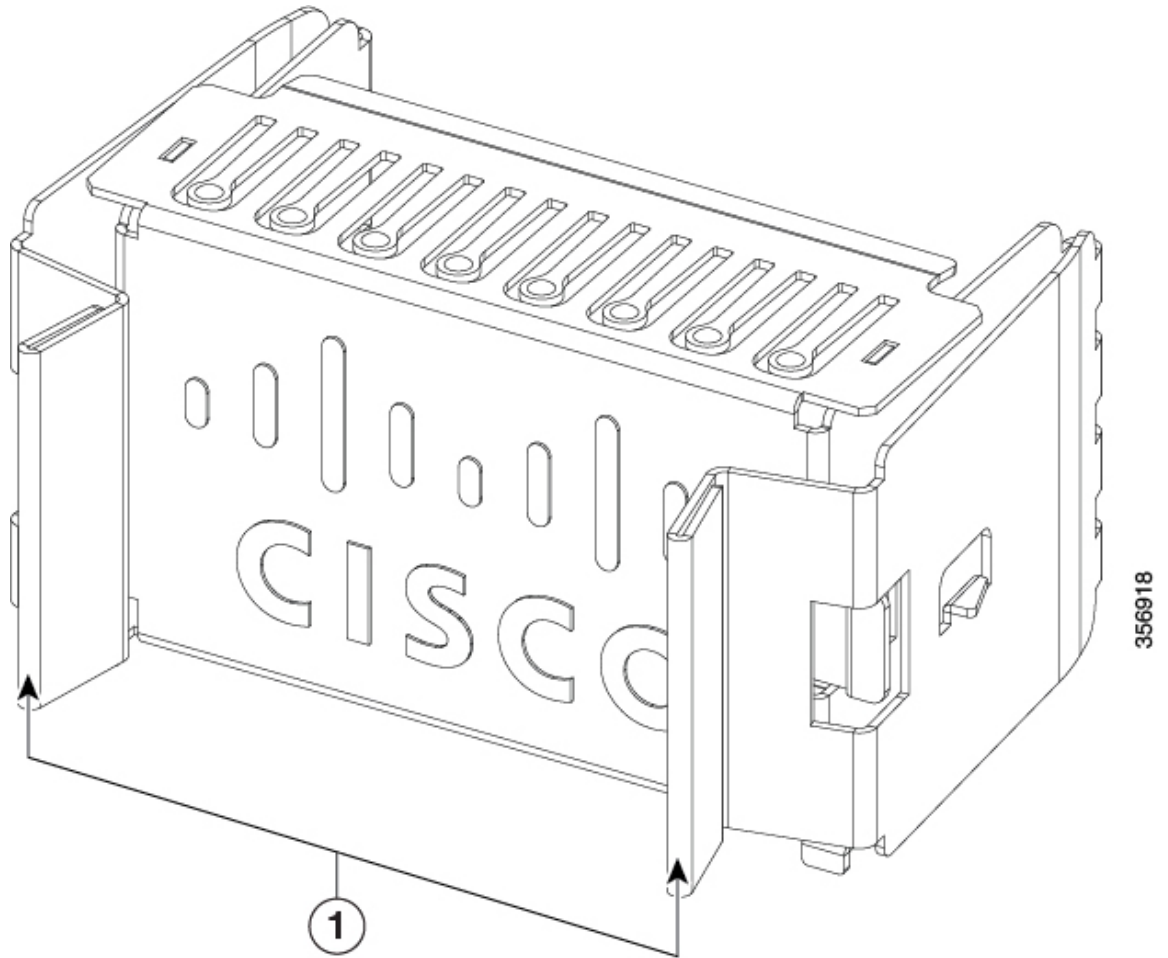
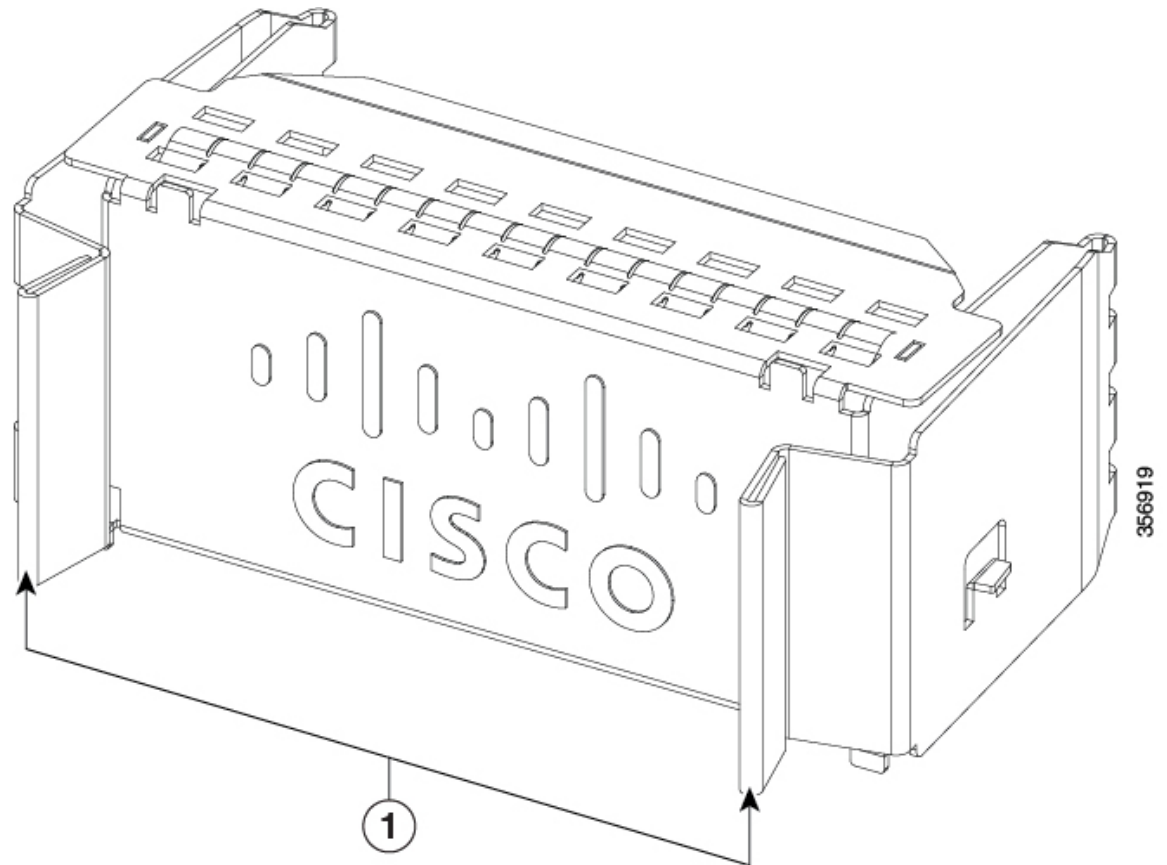


Figure 50: Power Supply Slot Cover for Cisco Catalyst 9500 High Performance C9500-32QC, C9500-48Y4C and C9500-24Y4C Switch Models



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 except the 1600W AC and DC power supply modules, have the following LEDs:

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

Table 14: LEDs on the AC/DC power supply modules

LED	Status	Description
Unlit	Off	No input power.

LED	Status	Description
Green	Blinking	12V aux output is on; 12V main output is off.
	Solid	Both 12V aux output and 12V main output are on; Power supply is functioning normally.
Amber	Blinking	Warning detected. OR AC power cord is not inserted properly.
	Solid	Critical error detected.

The 1600W AC and DC power supply modules have a bi-color (green/amber) LED to indicate the status of the power supplies.

Table 15: LEDs on the 1600W AC/DC power supply modules

LED Status	Description
Off	No input power.
Solid amber	Critical error detected; PSU 12V main output is off.
Solid green	Both 12V aux output and 12V main output are on; Power supply is functioning normally.
1Hz blinking amber	Warning detected; PSU 12V main output is on.
2Hz blinking green	PSU 12V main output is off and 12V aux output is on.

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**

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Installing Power Supply

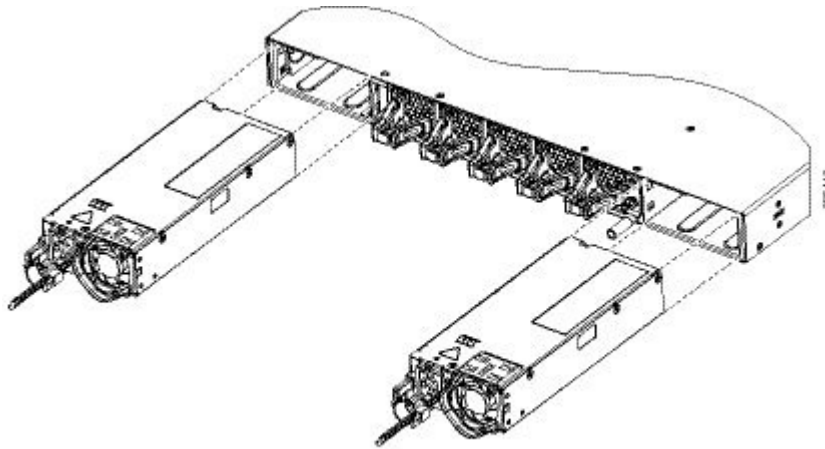
Inserting the Power Supply

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 amber LED on the power supply blinks continuously.

Figure 51: Installing the Power Supply



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:



Warning Take care when connecting units to the supply circuit so that wiring is not overloaded. Statement 1018

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:



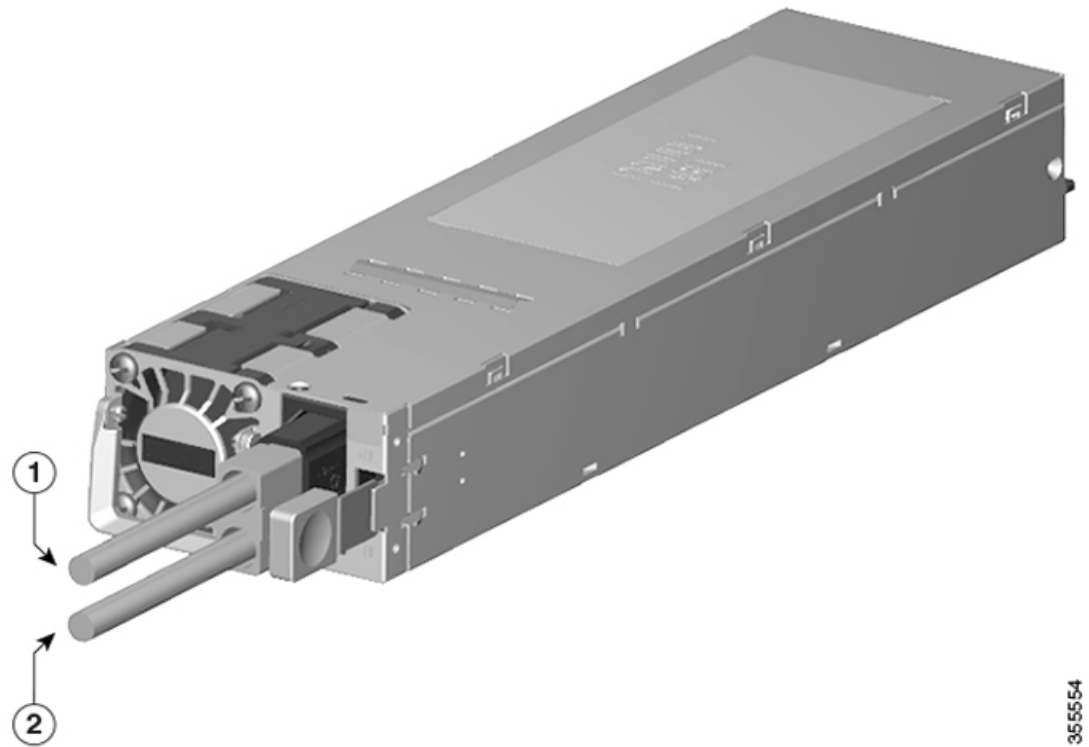
Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. **Statement 1003**



Warning Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. **Statement 1075.**

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** Depending on the power supply installed, install the two cables from the DC power supply to the DC power source as follows:
- If you are using C9K-PWR-1600WDC-R or C9K-PWR-930WDC-R, do the following:
 - 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.

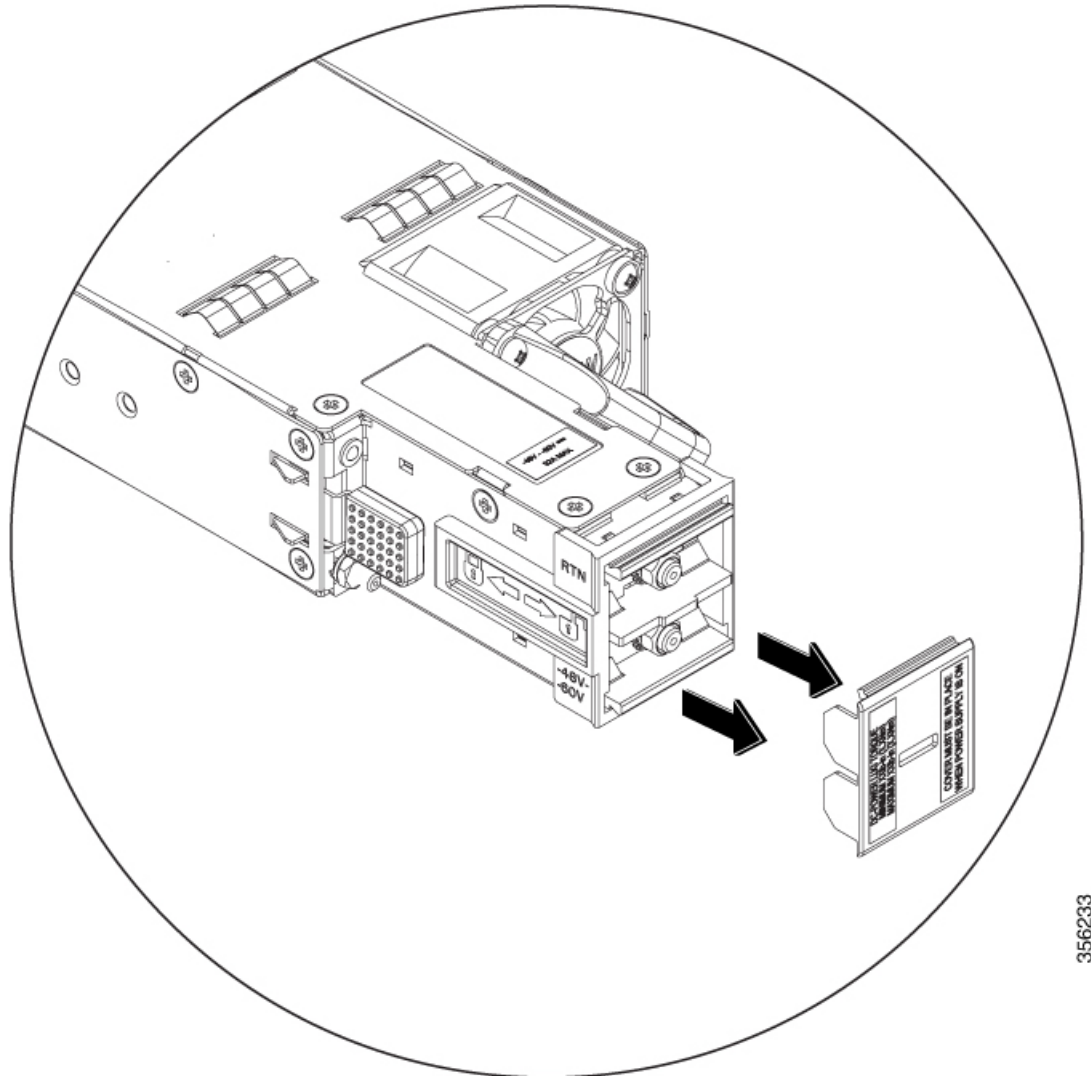


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1	Positive terminal	2	Negative terminal
---	-------------------	---	-------------------

- If you are using PWR-C4-950WDC-R, do the following:
 - a. Remove the safety cover on the terminal box on the front of the DC power supply.

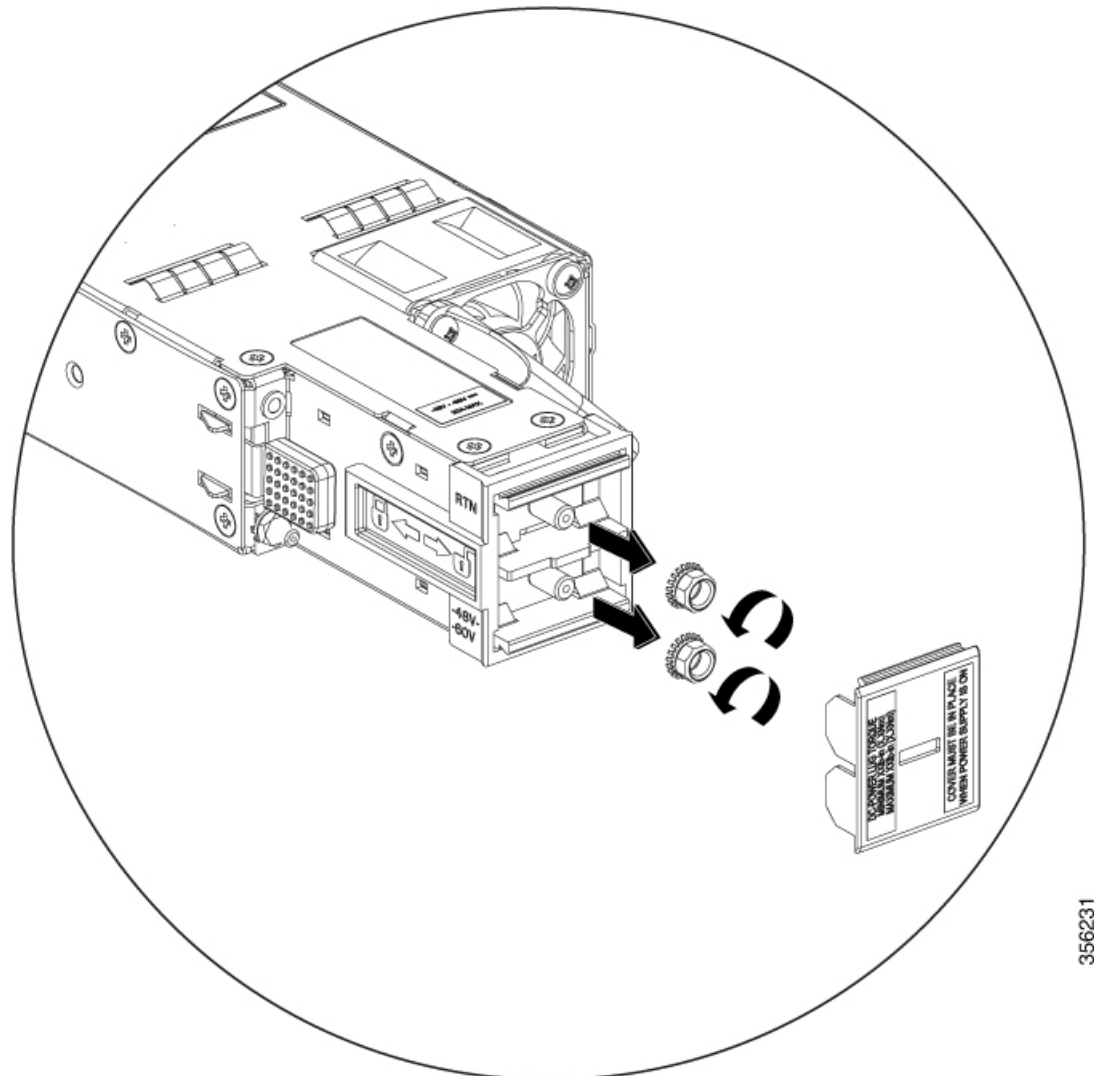
Figure 52: Remove the Safety Cover



356233

- b.** Loosen and unscrew the two nuts on the terminal box. The terminal box has two slots for power terminals. Each terminal has a nut that you use to fasten the power cable to the terminal.

Figure 53: Removing the Nuts on the Terminal Box



356231

- c. Secure the positive (+) DC power cable lug to the RTN terminal and the negative (–) DC power cable lug to the –48V terminal with the nuts.
To tighten the nuts, apply torque between 7 lbf.in (0.8Nm) and 10lbf.in (1.1 Nm) to each nut.
- d. Replace the safety cover over the terminal box on the DC power supply.

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

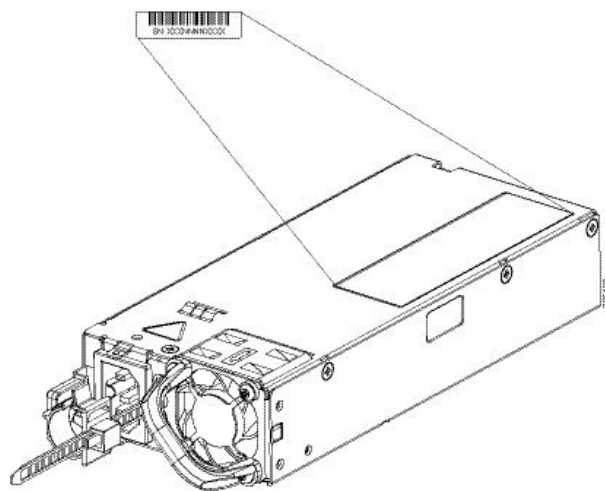
- Step 1** Turn off the power to the power supply that you are removing, as follows:
- If you are removing a DC-input power supply, ensure that the power is turned off at the power source by turning off the power for that circuit.
- Step 2** Detach the power and ground cables, as follows:
- For the AC-input 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 54: Serial Number on the Power Supply



Installing a Fan Module

Fan Module Overview

Depending on the switch model, five individual fan modules (C9500-32C and Catalyst 9500 Series switches) or two fan trays with dual-stacked fans (C9500-24Y4C, C9500-48Y4C and C9500-32QC) are available. In models using 5 fan modules, the switch can operate with 4 operational fans and 1 nonfunctional fan. Any failed fan should be replaced as soon as possible to avoid service interruption due to a second fan fault.

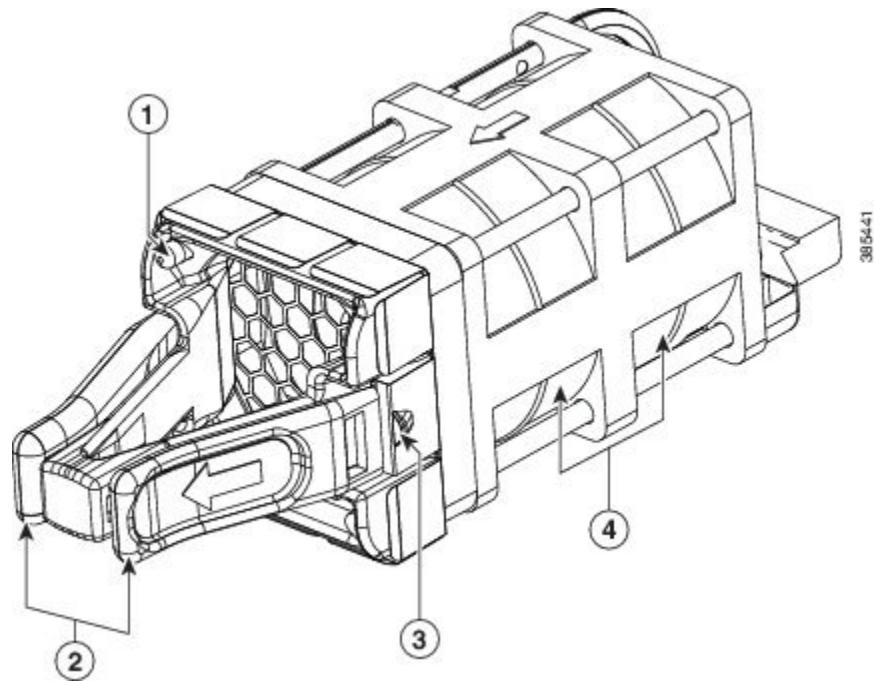
For the switch to boot-up, ensure the following conditions are met.

- the switches using FAN-T4-R and C9K-T2-FANTRAY= modules must at a minimum have 4 fans operating normally
- the switches using C9K-T1-FANTRAY modules must have 2 fan tray modules with all the 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.

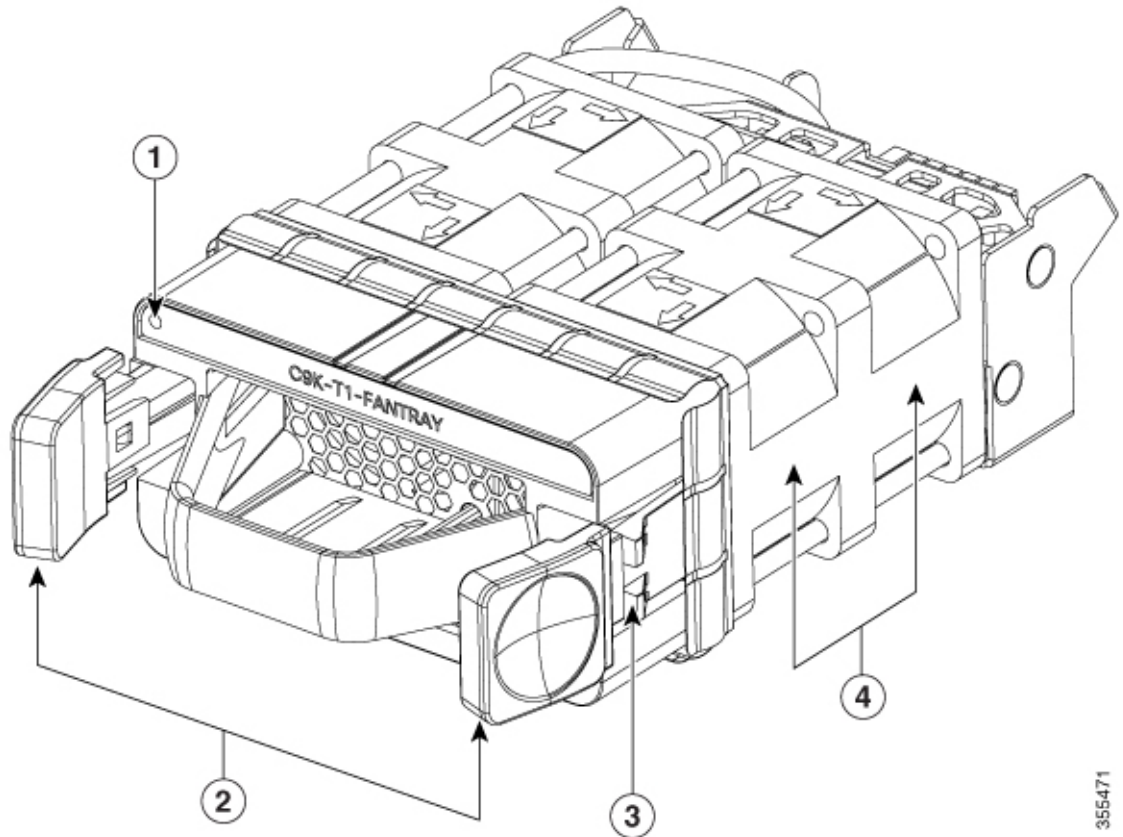
Part Number	Supported Switches	Description
FAN-T4-R=	Cisco Catalyst 9500 Series switches: C9500-12Q C9500-24Q C9500-40X C9500-16X	<ul style="list-style-type: none"> • Each switch contains five individual fan modules operating in N+1 redundancy mode. • Type 4 hot-swappable fan module.
C9K-T2-FANTRAY=	Cisco Catalyst 9500 Series High Performance switch: C9500-32C	
C9K-T1-FANTRAY=	Cisco Catalyst 9500 Series High Performance switches: C9500-32QC C9500-48Y4C C9500-24Y4C	<ul style="list-style-type: none"> • Each switch contains two fan tray units with dual-stacked fans. • Functions in the event of the failure of one of the fans in the fan tray unit. The individual fans are not replaceable; you must replace the fan unit.

Figure 55: FAN-T4-R Fan Module and C9K-T2-FANTRAY=



1	Fan assembly levers	3	Fan LED
2	Fan	4	Fan assembly retention latch

Figure 56: Fan Tray Unit with Dual-Stacked Fans



355471

1	Fan LED	3	Fan assembly retention latch
2	Fan assembly levers	4	Fans

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.



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

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.
- Warning** Do not reach into a vacant slot when installing or removing a module. Exposed circuitry is an energy hazard. Statement 206

Figure 57: Installing the Fan Module on a Cisco Catalyst 9500 Series Switch

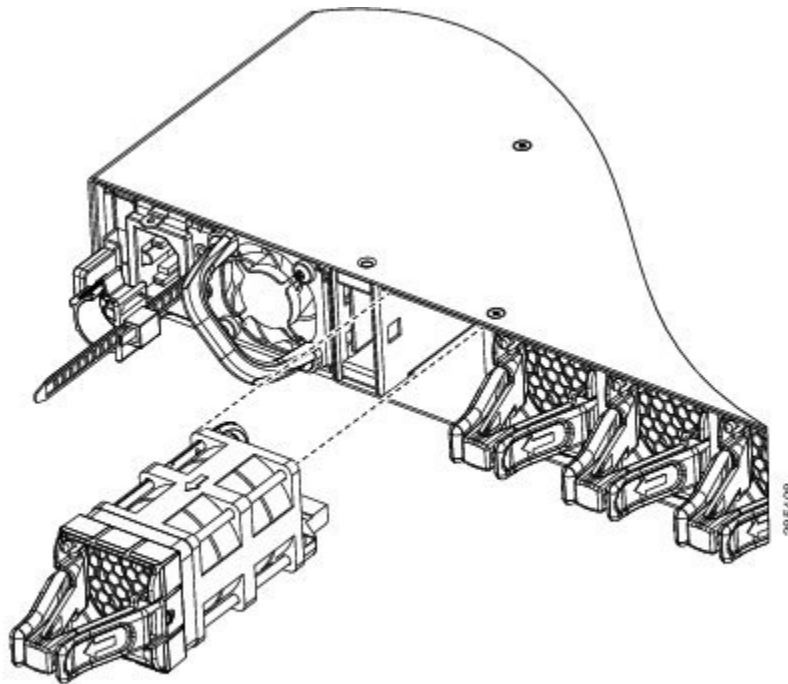


Figure 58: Installing the Fan Module on Cisco Catalyst 9500 High Performance C9500-32C Switch Model

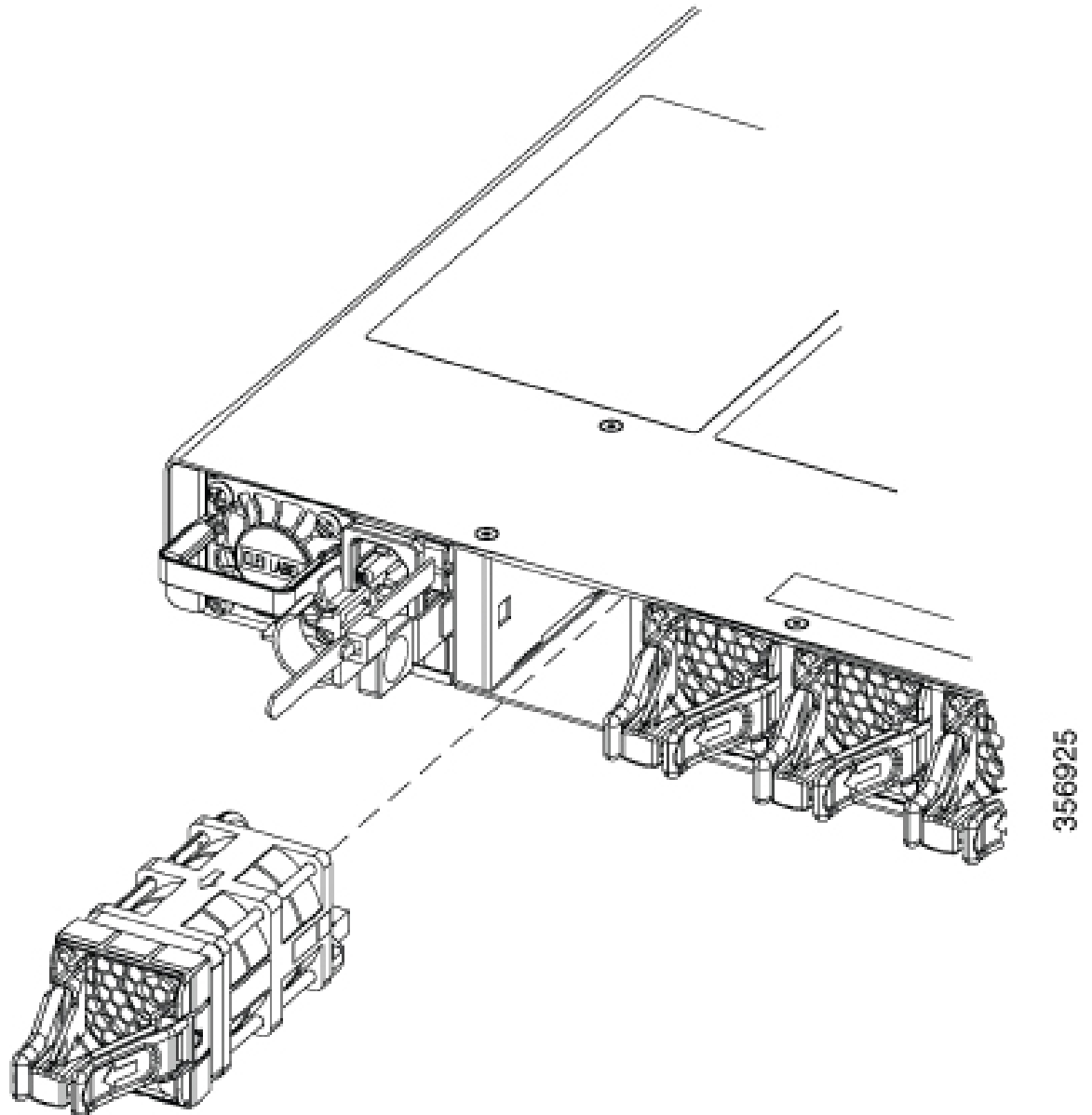
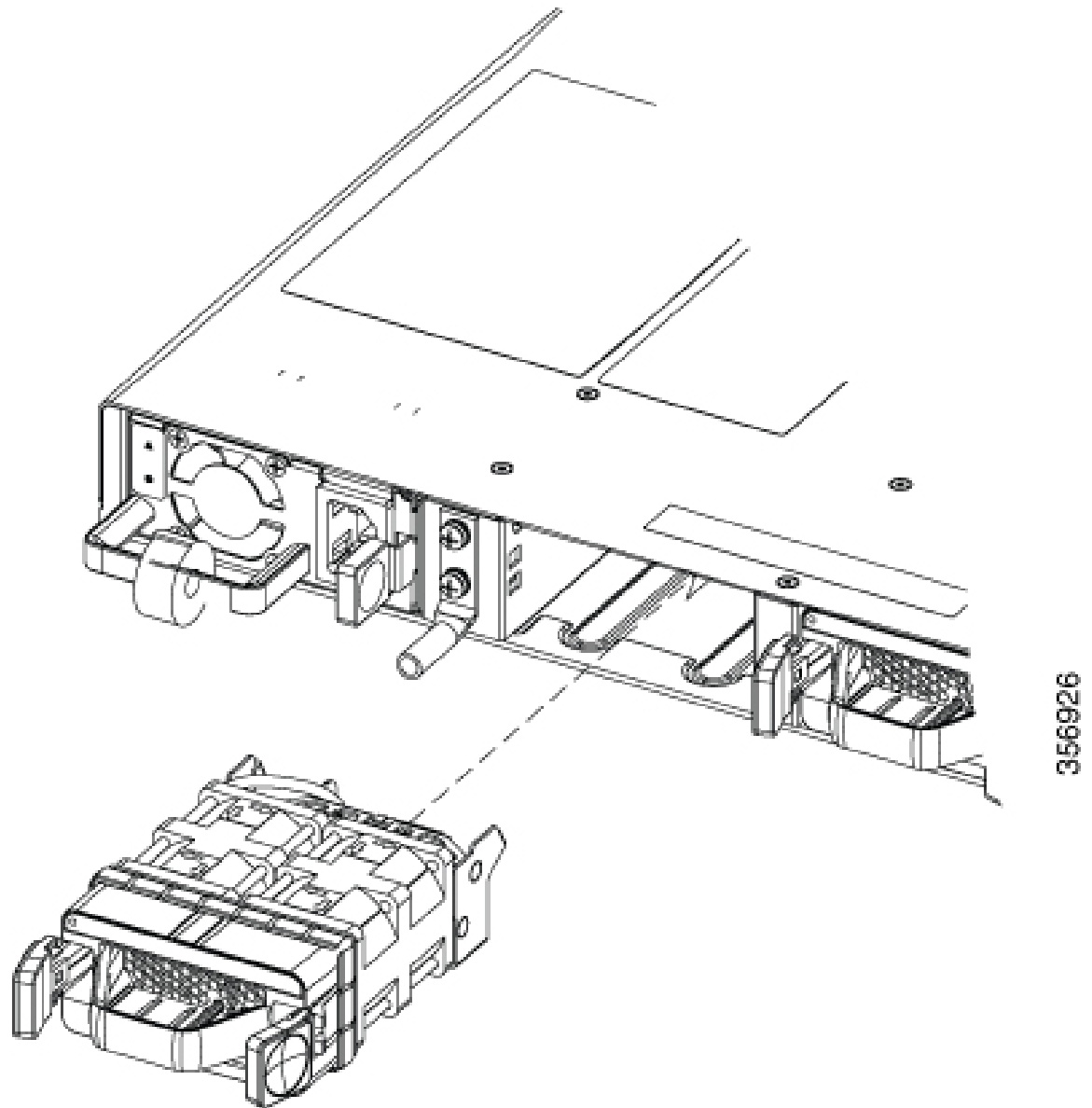


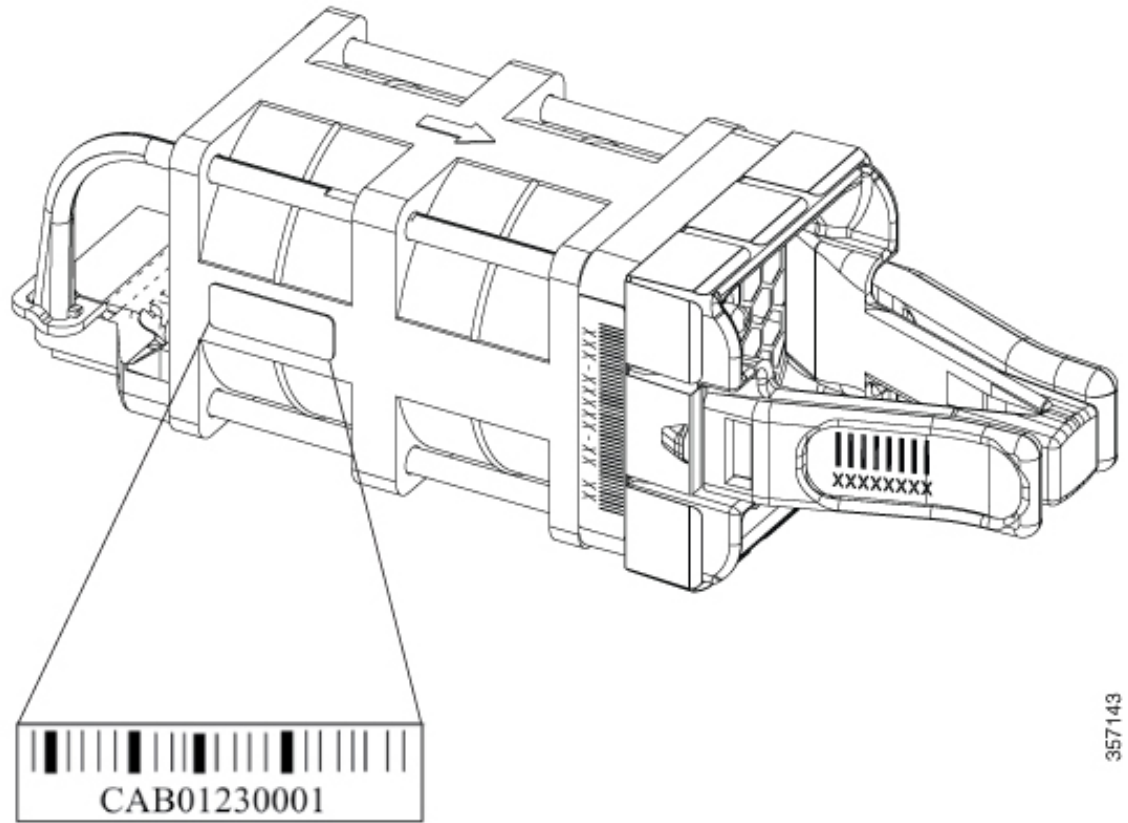
Figure 59: Installing the Fan Module on Cisco Catalyst 9500 High Performance C9500-32QC, C9500-48Y4C and C9500-24Y4C Switch Models



Finding the Fan Module Serial Number

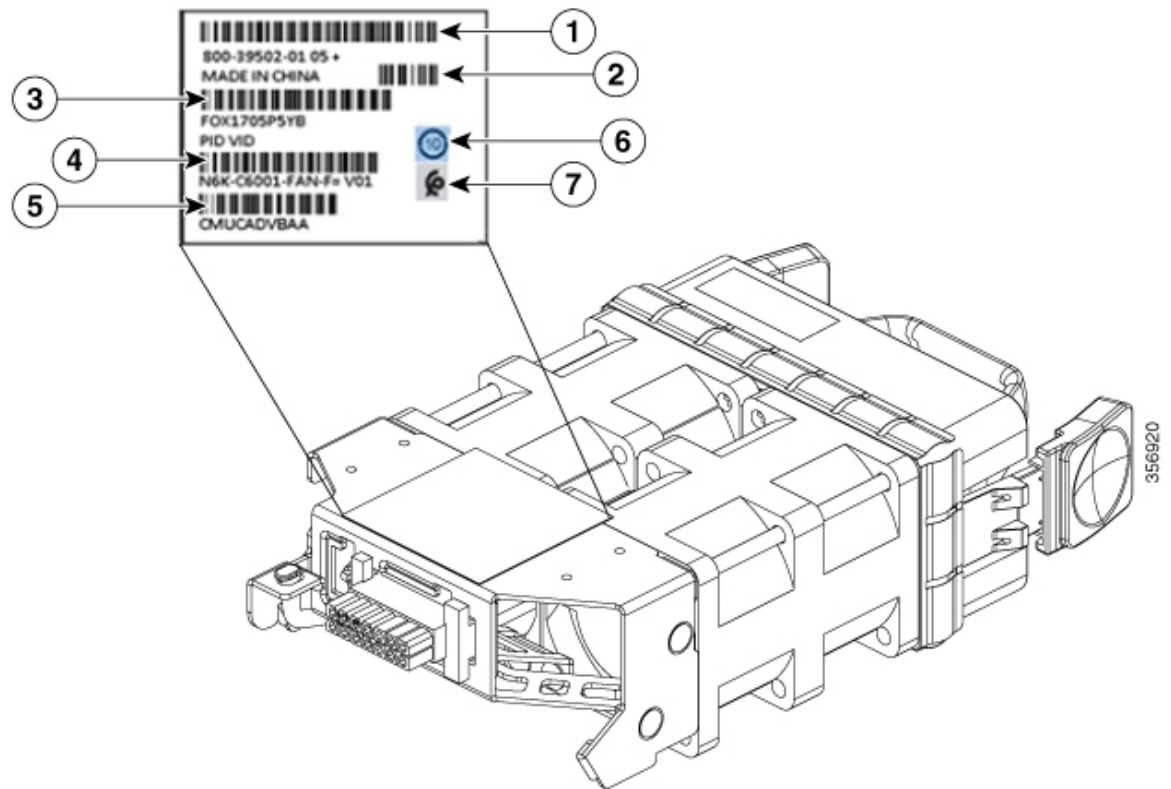
If you contact Cisco Technical Assistance regarding a fan module, you need to know the fan module serial number. See the following illustration to find the serial number.

Figure 60: Fan Module Serial Number on Cisco Catalyst 9500 Series switches and High Performance Switch C9500-32C Switch



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Figure 61: Fan Module Serial Number on Cisco Catalyst 9500 High Performance C9500-32QC, C9500-48Y4C and C9500-24Y4C Switch Models



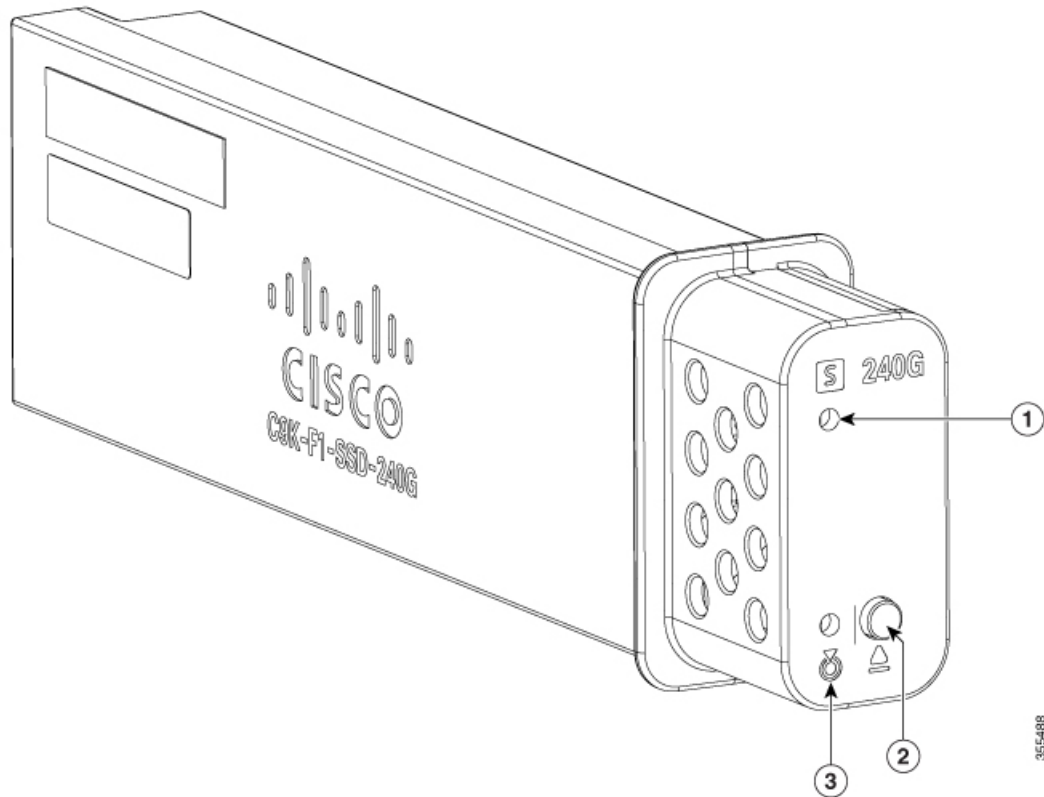
1	Product Number	5	CLEI
2	Country of Origin	6	China RoHS
3	Serial Number	7	Morocco Logo
4	PID/VID	-	-

Installing an SSD Module

SATA SSD Module Overview

SATA SSD module is available as a field-replaceable unit (FRU). The SSD module has a button which facilitates hot-swapping of the module. To prevent data loss, press the hot-swap button to request removal and wait for the system to confirm safe-removal by turning off the status LED.

Figure 62: SATA SSD Supported on Cisco Catalyst 9500 Series High Performance Switches



1	Status LED	3	Blue beacon LED
2	Hot-swap button	-	-

The following table lists the SATA SSD modules supported on Cisco Catalyst 9500 Series High Performance Switches.

SATA SSD	Description
C9K-F1-SSD-240G	Cisco Catalyst 9500 Series 240GB SATA memory
C9K-F1-SSD-480G	Cisco Catalyst 9500 Series 480GB SATA memory
C9K-F1-SSD-960G	Cisco Catalyst 9500 Series 960GB SATA memory

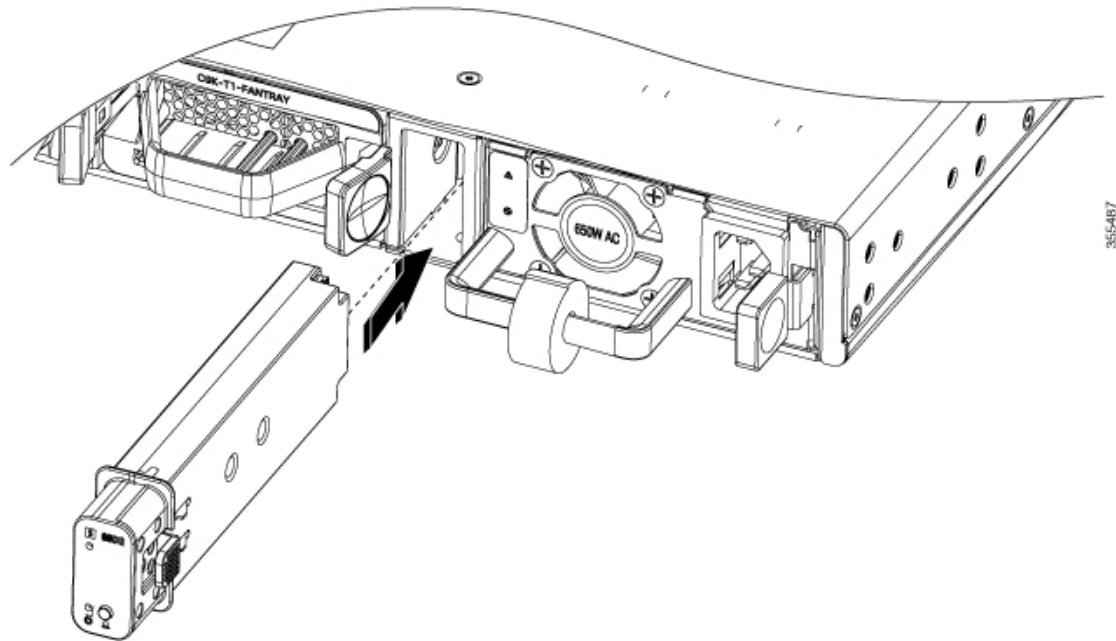
Installing an SSD Module

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 63: Installing an SSD Module on a Cisco Catalyst 9500 Series High Performance Switch



- Step 3** On Cisco Catalyst 9500 Series High Performance Switches, verify that the LED on the SSD module turns solid green.

Removing an SSD Module

Procedure

- Step 1** On Cisco Catalyst 9500 Series High Performance switches, press and hold the hot-swap button on the SSD module for at least four seconds.

The system powers down the SSD module and the port and the LED turns off indicating that the module is ready for removal.

Also, the switch console displays the following messages indicating safe removal.

```
*Mar 12 11:22:22.285: %IOSXE-3-PLATFORM: R0/0: kernel: ata1: irq_stat
0x00400040, connection status changed
*Mar 12 11:22:28.310: %IOSXE-4-PLATFORM: R0/0: kernel: ata1: limiting
SATA link speed to 1.5 Gbps
*Mar 12 11:22:33.613: %IOSXE-4-PLATFORM: R0/0: kernel: ata1.00: disabled
```

- 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 88](#).



CHAPTER 7

Troubleshooting

- [Getting Started, on page 91](#)
- [Solving Problems at the System Component Level, on page 91](#)
- [Identifying Startup Problems, on page 92](#)
- [Troubleshooting the Power Supply, on page 92](#)
- [Troubleshooting the Fan Tray , on page 93](#)
- [Status LED Indicators, on page 93](#)
- [Contacting Cisco Customer Service, on page 93](#)
- [Finding the Serial Number, on page 94](#)

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 93](#).

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 111](#) 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:

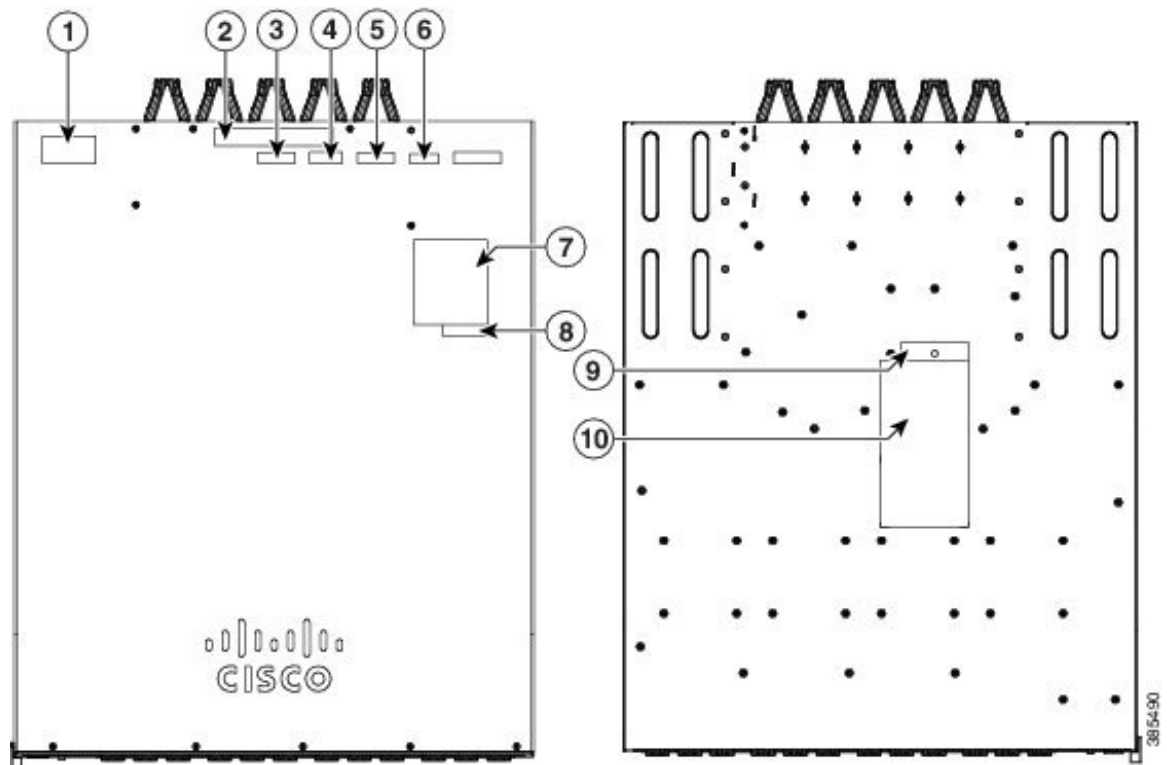
- Date on which you received the switch
- Chassis serial number
- Type of software and release number
- Maintenance agreement or warranty information
- Brief description of the problem
- Brief explanation of the steps you have already taken to isolate and resolve the problem

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 64: Serial Number Location and Switch Labels on a Cisco Catalyst 9500 Series Switches

Serial number of the switch is located at the top of the switch. Following illustrations show all the labels at the top and the bottom of a switch.

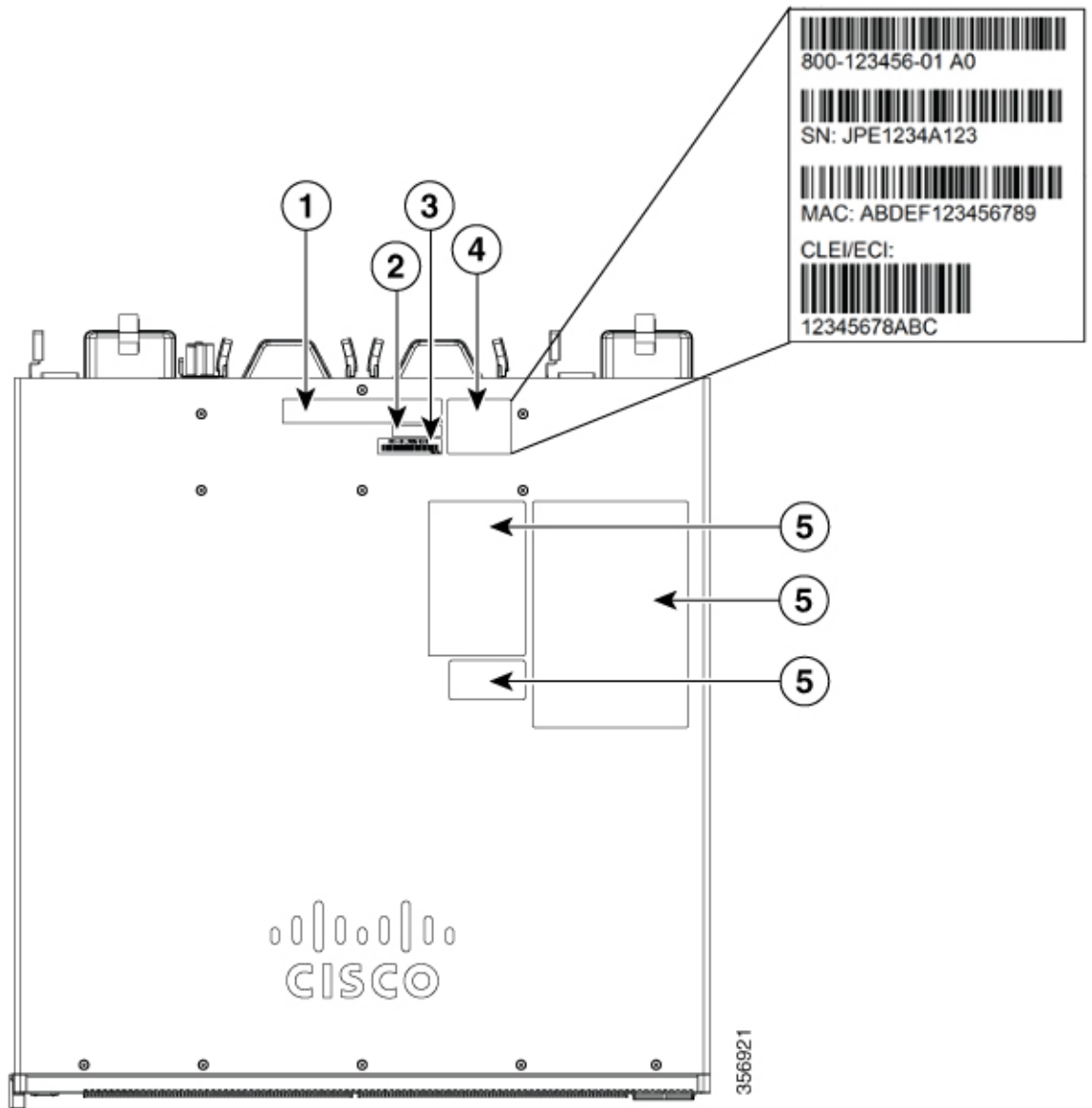


1	MultI Power Warning	6	Serial Number
2	Fan Tray Warning	7	Laser Warning
3	RFID	8	Caution ESD

4	CLEI	9	Lab Altitude
5	MAC Number	10	Compliance label

Figure 65: Serial Number Location and Switch Labels on Cisco Catalyst 9500 High Performance Series Switches

Serial number of the switch is located at the top of the switch. Following illustration shows all the labels at the top and the bottom of the switch.



1	Fan Tray Warning	4	Product Number / Serial Number / MAC number / CLEI
2	Country of Origin	5	Agency

3	PID/VID	-	-
---	---------	---	---



APPENDIX **A**

Technical Specifications

- [Technical Specifications](#), on page 97
- [AC Power Cord Specifications](#), on page 99
- [DC Power Cable Specifications](#), on page 103

Technical Specifications

This table describes the environmental specifications.

Table 16: Environmental Specifications for the Switch

Environmental Ranges	
Operating temperature	• 32°F to 104°F (0 to 40°C)
Storage temperature	• -4°F to 149°F (-20°C to 65°C)
Relative humidity	• Operating : 5 to 90% (noncondensing) • Non-Operating : 5% to 95% (noncondensing)
Operating altitude	Up to 6000 ft (1800 m)
Storage altitude	Up to 15,000 ft (4500 m)

Table 17: Acoustic Measurements for the Switches

	Switch Model	Sound Power Level
Cisco Catalyst 9500 Series Switches	C9500-12Q	No greater than 70.4 L _{WA} dB
	C9500-24Q	No greater than 70.4 L _{WA} dB
	C9500-16X	No greater than 68.3 L _{WA} dB
	C9500-40X	No greater than 68.3 L _{WA} dB

	Switch Model	Sound Power Level
Cisco Catalyst 9500 Series High Performance Switches	C9500-32C	No greater than 76.7 L _{WAd} dB
	C9500-32QC	No greater than 72.1 L _{WAd} dB
	C9500-24Y4C	No greater than 71.5 L _{WAd} dB
	C9500-48Y4C	No greater than 71.5 L _{WAd} dB

This table describes the physical specifications.

Table 18: Physical Specifications for the Switch

Physical Specifications		
Dimensions (H x W x D)	1.73 x 17.5 x 21.5 in. (4.4 x 44.5 x 56.7 cm)	C9500-12Q
		C9500-24Q
		C9500-40X
		C9500-16X
	1.73 x 17.5 x 21.2 in. (4.4 x 44.5 x 56.8 cm)	C9500-32C
	1.73 x 17.5 x 18.0 in. (4.4 x 44.5 x 45.7 cm)	C9500-32QC
		C9500-48Y4C
C9500-24Y4C		
Rack units (RU)	1 RU	
Chassis with 2 power supplies and built-in fan	25.75 lbs (11.68 kg)	C9500-12Q
		C9500-24Q
		C9500-40X
	23.6 lbs (10.7 kg)	C9500-16X
	25.64 lbs (11.63 kg)	C9500-32C
	21.85 lbs (9.91 kg)	C9500-32QC
	21.96 lbs (9.96 kg)	C9500-48Y4C
	20.99 lbs (9.52 kg)	C9500-24Y4C

This table describes the power requirements.

Table 19: Power Requirements

Power Requirements		
Input Voltage	115 to 230 VAC	C9500-12Q
		C9500-16X
		C9500-24Q
		C9500-40X
	90 to 264 VAC	C9500-32C
		C9500-32QC
		C9500-48Y4C
		C9500-24Y4C

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**
- 2000W power supply power cord has an IEC60320/C15 appliance connector at one end.

Figure 66: IEC60320/C15 Appliance Connector

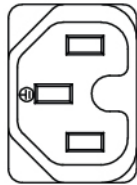

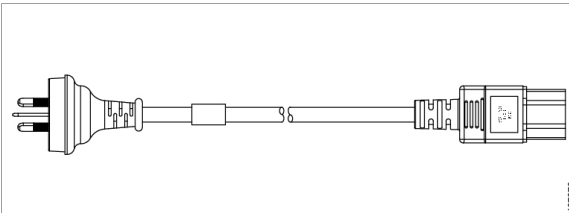
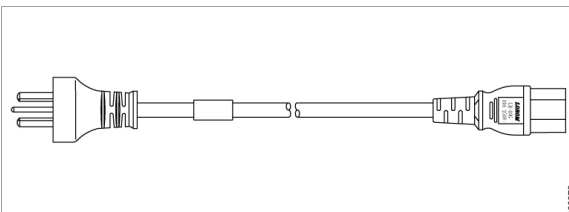
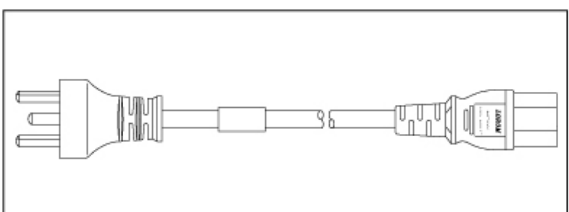
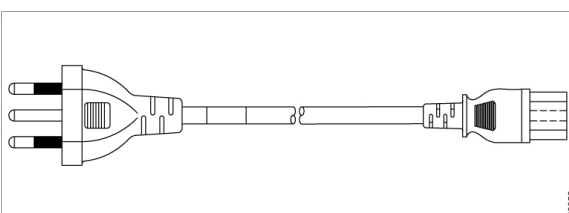
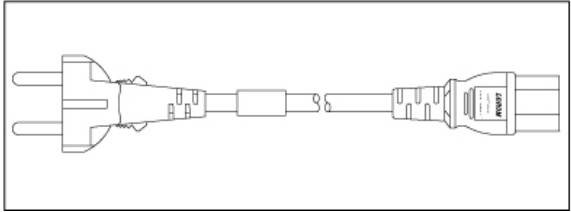
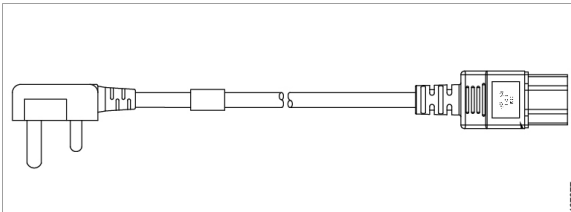
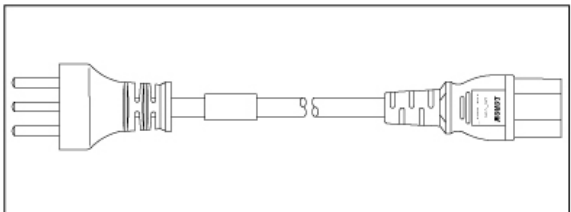
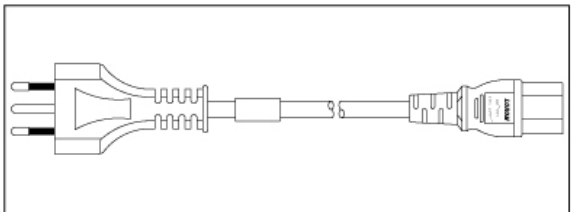
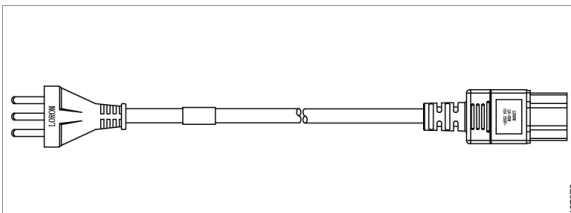
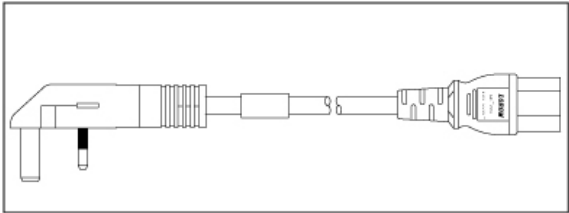
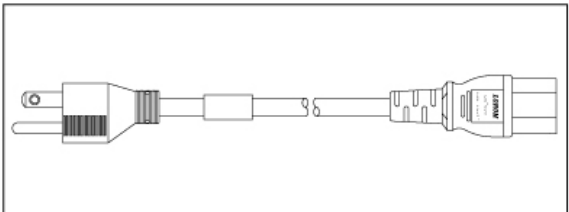
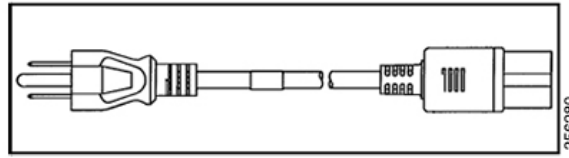
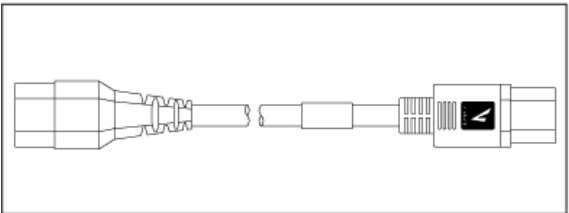


Table 20: AC Power Cords for C9500 Series Switches and C9500 Series High Performance Switches

Locale	Part Number	Cordset Rating	Length	AC Source Plug Type
Japan	CAB-C15-CBN-JP	250 VAC, 12 A	3.05 m	<p><i>Figure 67: CAB-C15-CBN-JP=(Japan)</i></p>

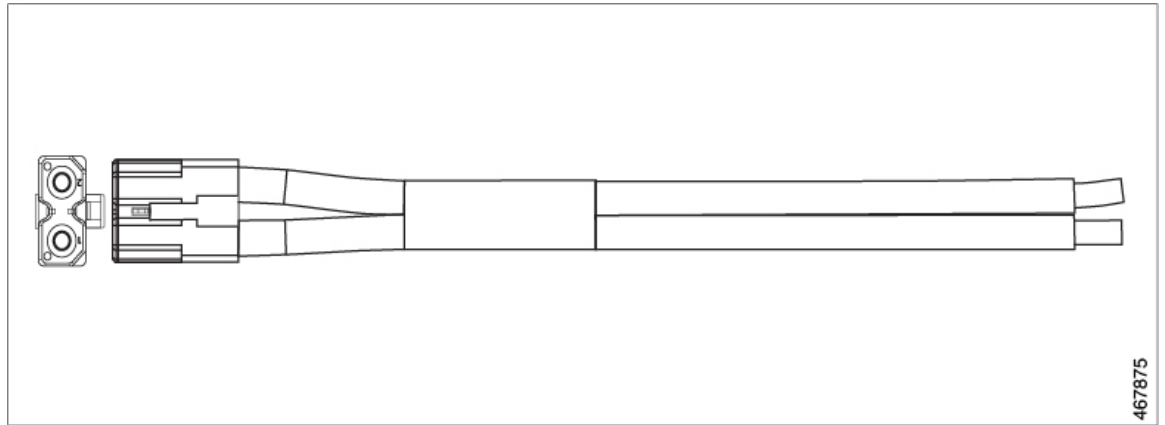
Locale	Part Number	Cordset Rating	Length	AC Source Plug Type
Japan	CAB-TA-250V-JP	250 VAC, 15 A	2.5 m	<p>Figure 68: CAB-TA-250V-JP= (Japan)</p> 
Australia	CAB-TA-AP	250 VAC, 15 A	2.5 m	<p>Figure 69: CAB-TA-AP= (Australia)</p> 
Argentina	CAB-TA-AR	250 VAC, 10 A	2.5 m	<p>Figure 70: CAB-TA-AR= (Argentina)</p> 
Denmark	CAB-TA-DN	250 VAC, 10 A	2.5 m	<p>Figure 71: CAB-TA-DN= (Denmark)</p> 
Brazil	CAB-ACBZ-10A	250 VAC, 10 A	2.44 m	<p>Figure 72: CAB-ACBZ-10A= (Brazil)</p> 

Locale	Part Number	Cordset Rating	Length	AC Source Plug Type
Europe	CAB-TA-EU	250 VAC, 10 A	2.5 m	<p>Figure 73: CAB-TA-EU= (Continental Europe)</p> 
India	CAB-TA-IN	250 VAC, 16 A	2.5 m	<p>Figure 74: CAB-TA-IN= India</p> 
Israel	CAB-TA-IS	250 VAC, 16 A	2.5 m	<p>Figure 75: CAB-TA-IS= (Israel)</p> 
Italy	CAB-TA-IT	250 VAC, 10 A	2.5 m	<p>Figure 76: CAB-TA-IT= (Italy)</p> 
Switzerland	CAB-TA-SW	250 VAC, 16 A	2.5 m	<p>Figure 77: CAB-TA-SW= (Switzerland)</p> 

Locale	Part Number	Cordset Rating	Length	AC Source Plug Type
United Kingdom	CAB-TA-UK	250 VAC, 10 A	2.5 m	<p>Figure 78: CAB-TA-UK= (United Kingdom)</p> 
North America	CAB-TA-NA	125 VAC, 12 A	2.5 m	<p>Figure 79: CAB-TA-NA= (North America)</p> 
Japan	CAB-TA-JP	125 VAC, 12 A	2.5 m	<p>Figure 80: CAB-TA-JP= (Japan)</p> 
All countries except Japan	CAB-C15-CBN	250 VAC, 13 A	1.22 m	<p>Figure 81: CAB-C15-CBN=</p> 

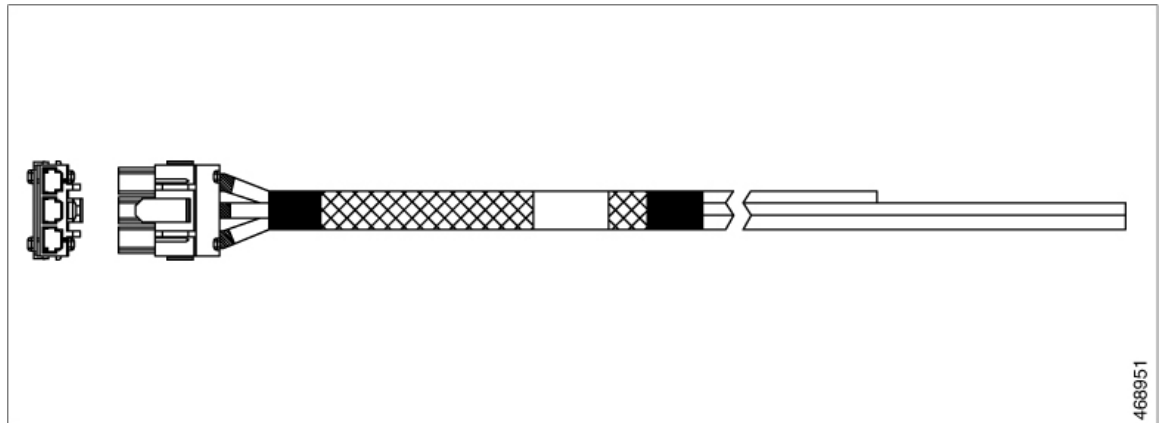
DC Power Cable Specifications

Figure 82: PWR-2KW-DC-CBL



46875

Figure 83: CAB-48DC-40A-8AWG



468951



APPENDIX **B**

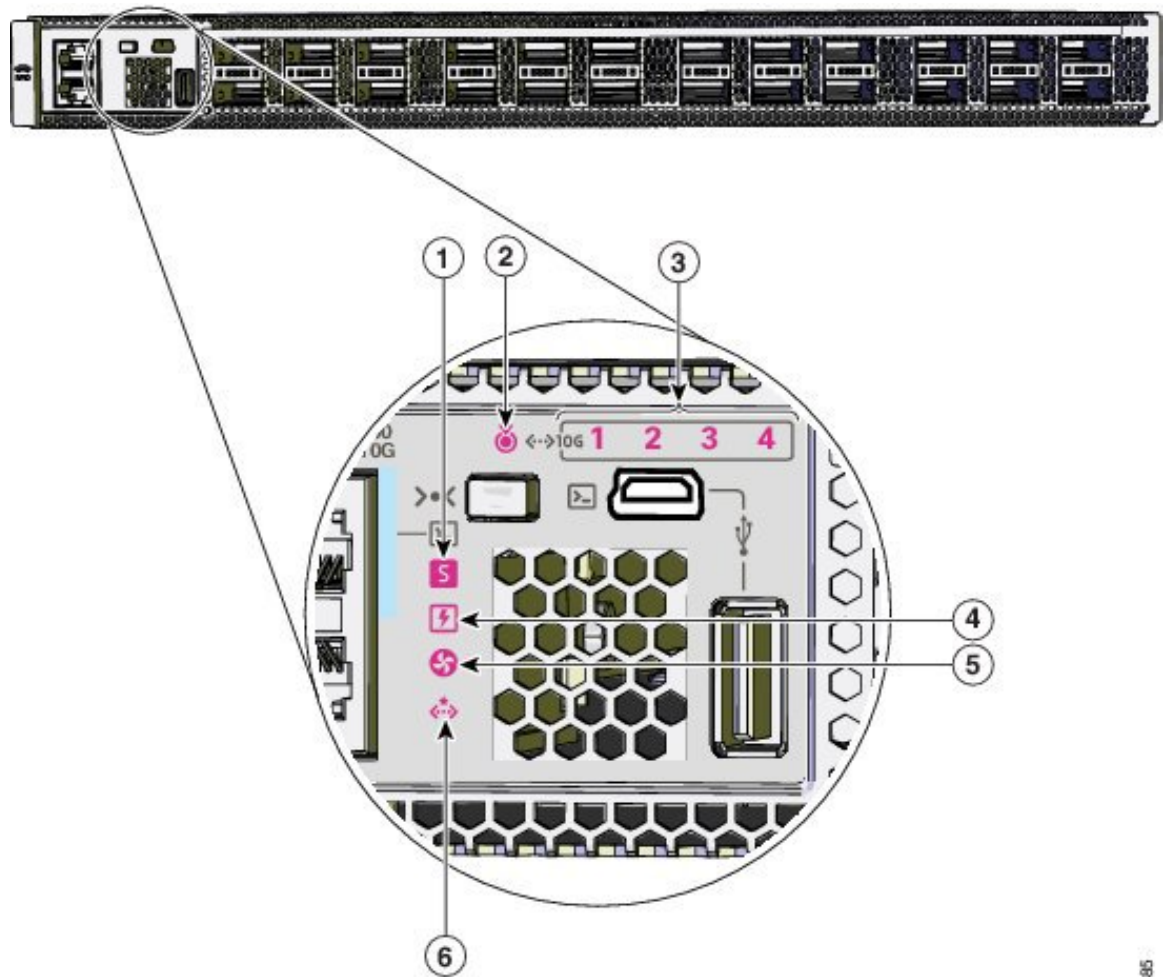
Understanding the LEDs

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 106](#)
- [System LED, on page 107](#)
- [Power Supply LEDs, on page 108](#)
- [Port LEDs and Modes, on page 108](#)
- [Beacon LED, on page 110](#)
- [Fan LED, on page 111](#)
- [Ethernet Management Port LED, on page 111](#)

LED Indicators

Figure 84: LEDs on Cisco Catalyst 9500 Series Switches

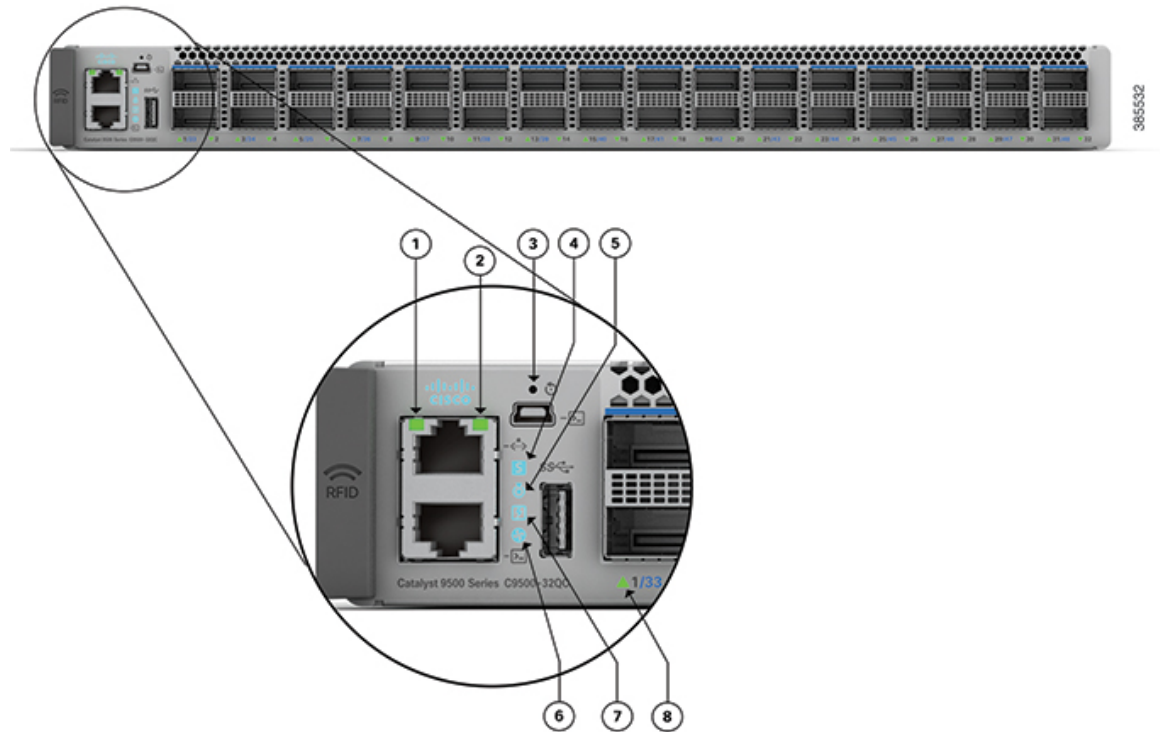


1	System LED	4	Power Supply Unit(PSU) LED
2	Blue beacon LED	5	Fan LED
3	10G Status LEDs ¹	6	Ethernet Management port LED

¹ Available only on switches with 10G ports.

3854-85

Figure 85: LEDs on Cisco Catalyst 9500 Series High Performance Switches



1	Ethernet Management port link activity LED	5	Blue beacon LED
2	Ethernet Management port link status LED	6	Fan LED
3	Reset switch	7	Power Supply Unit (PSU) LED
4	System LED	8	Port LEDs

System LED

The system LED indicates the status of the system.

Table 21: 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

The following table describes the LED indicators when two power supplies modules are installed in the switch.

Table 22: Power Supply LED Indicators for Two PSUs

Color/State	Description
Green	Power supply is operating normally.
Amber	One of the PSU has input loss.
Red	One of the PSU has output failure.

The following table describes the LED indicators for a standalone switch.

Table 23: Power Supply LED Indicators for a Standalone Switch

Color/State	Description
Green	Both PSUs are in the bay with active power.
Amber	Missing PSU or no power feed.

Port LEDs and Modes

Cisco Catalyst 9500 Series Switches

Each Ethernet port, 1-Gigabit Ethernet module slot, and 10-Gigabit Ethernet module slot has a port LED. These port LEDs, as a group or individually, display information about the switch and about the individual ports. The port mode determines the type of information shown by the port LEDs.

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

When you press the Mode button on any switch in the switch stack, all the stack switches change to show the same selected mode. For example, if you press the Mode button on the active switch to show the SPEED LED, all the other switches in the stack also show the SPEED LED.

Table 24: Port Mode LEDs

Mode LED	Port Mode	Description
STAT	Port status	The port status. This is the default mode.
SPEED	Port speed	The port operating speed: 10, 100, or 1000 Mb/s.
DUPLX	Port duplex mode	The port duplex mode: full duplex or half duplex.
ACTV	Active	The active switch status.

Mode LED	Port Mode	Description
STACK	Stack member status	Stack member status.
	StackWise port status	The StackWise port status.

Table 25: Meaning of Switch LED Colors in Different Modes

Port Mode	Port LED Color	Meaning
STAT (port status)	Off	No link, or port was administratively shut down.
	Green	Link present, no activity.
	Blinking green	Activity. Port is sending or receiving data.
	Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
	Amber	Port is blocked by Spanning Tree Protocol (STP) and is not forwarding data. After a port is reconfigured, the port LED can be amber for up to 30 seconds as STP checks the switch for possible loops.
SPEED	10/100/1000/SFP ports	
	Off	Port is operating at 10 Mb/s.
	Green	Port is operating at 100 Mb/s.
	Single green flash (on for 100 ms, off for 1900 ms)	Port is operating at 1000 Mb/s.
	Blinking twice	Port is operating at 2500, 5000 or 10000 Mb/s
	Network module slots	
	Off	Port is not operating.
	Blinking green	Port is operating at up to 10 Gb/s.
DUPLX (duplex)	Off	Port is operating in half duplex.
	Green	Port is operating in full duplex.

Port Mode	Port LED Color	Meaning
ACTV (data active switch)	Off	The switch is not the active switch. Note For a standalone switch, this LED is off.
	Green	The switch is the active switch.
	Amber	Error during active switch election.
	Blinking green	Switch is a standby member of a data stack and assumes active responsibilities if the current active switch fails.
STACK (stack member)	Off	No stack member corresponding to that member number.
	Blinking green	Stack member number.
	Green	Member numbers of other stack member switches.

Cisco Catalyst 9500 Series High Performance Switches

The port LEDs on the Cisco Catalyst 9500 Series High Performance Switches display only the port status.

Table 26: Meaning of Switch LED Colors for Port Status LED

Port LED Color	Meaning
Off	Link is not up.
Green	Link present.
Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
Amber	<ul style="list-style-type: none"> Port is blocked by Spanning Tree Protocol (STP) and is not forwarding data. After a port is reconfigured, the port LED can be amber for up to 30 seconds as STP checks the switch for possible loops. Port link is disabled, that is, administratively down.

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 27: Fan LED Indicator

Color/State	Description
Off	The fan is not receiving power; the fans have stopped.
Green	All fans are operating normally.
Amber	One or more fans have encountered tachometer faults.
Red	One or more fans' tachometer faults have exceeded the maximum limit.

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 28: Ethernet Management Port Link Activity LED

Color	Description
Blinking green	Link is up.
Off	Link is down.

Table 29: Ethernet Management Port Link Status LED

Color	Description
Solid green	Link is up.
Off	Link is down.



APPENDIX **C**

Connector and Cable Specifications

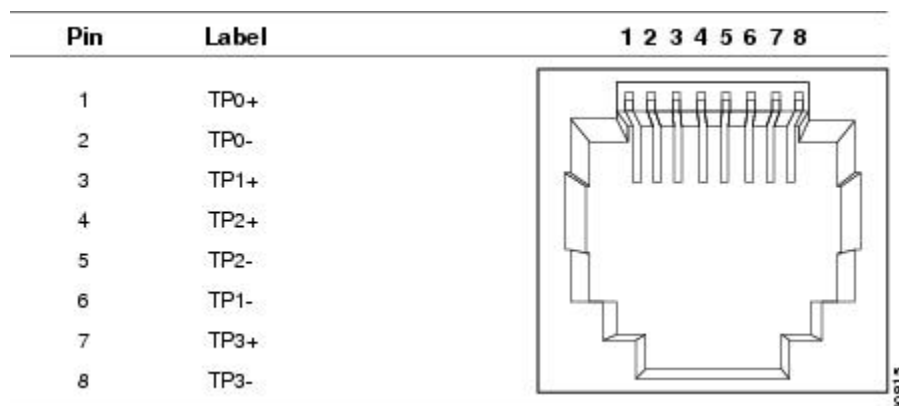
- [Connector Specifications, on page 113](#)
- [Console Cables, on page 114](#)
- [Cables and Adapters, on page 115](#)

Connector Specifications

10/100/1000 Ports

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

Figure 86: 10/100/1000 Port Pinouts



Module Connectors

This section describes the different SFP/QSFP/QSFP-DD module connectors used on 10G/25G/40G/100G/400G ports on the switches.

Figure 87: Duplex LC Cable Connector



Figure 88: Simplex LC Cable Connector

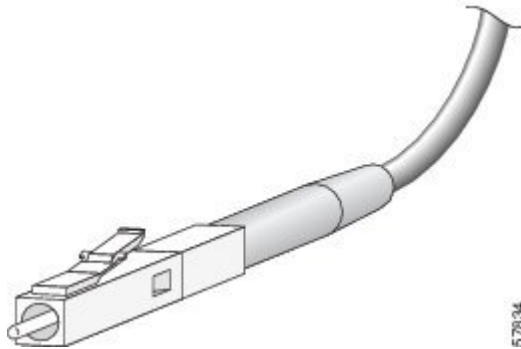


Figure 89: Copper SFP Module LC Connector

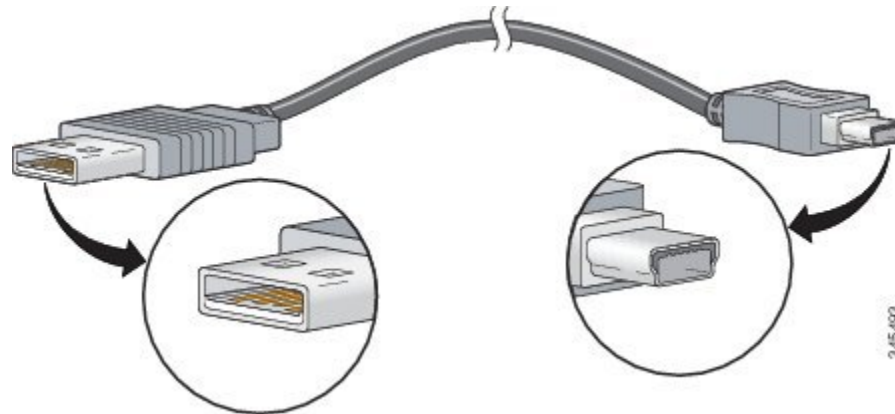
Pin	Label	1 2 3 4 5 6 7 8
1	TP0+	
2	TP0-	
3	TP1+	
4	TP2+	
5	TP2-	
6	TP1-	
7	TP3+	
8	TP3-	

Console Cables

Switch Name	Supported Console Cable
Cisco Catalyst 9500 Series Switches	USB Type A to 5-pin mini-Type B (CAB-CONSOLE-USB)
Cisco Catalyst 9500 Series High Performance Switches	

The USB console port uses a USB Type A to 5-pin mini-Type B cable and a USB Type A to Type C cable. These cables are not supplied with the switch; you have to order them separately.

Figure 90: USB Type A-to-USB 5-Pin Mini-Type B Cable



The RJ-45 console port uses an 8-pin RJ-45 connection. The supplied RJ-45-to-DB-9 adapter cable is used to connect the console port of the switch to a console PC. You need to provide an RJ-45-to-DB-25 female DTE adapter if you want to connect the switch console port to a terminal.

Cables and Adapters

Transceiver Module Network Cables

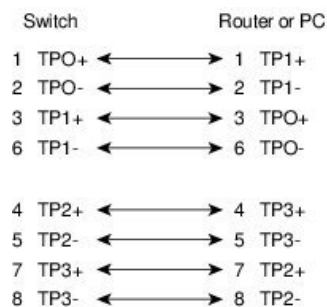
For cabling specifications, refer to the following notes:

- [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 91: Four Twisted-Pair Straight-Through Cable Schematic



6-52-72

Figure 92: Four Twisted-Pair Semi-Cross Cable Schematic

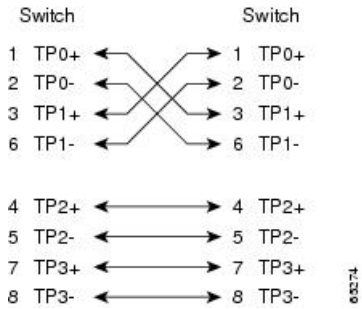


Figure 93: Two Twisted-Pair Straight-Through Cable Schematic

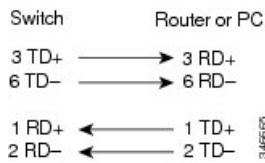
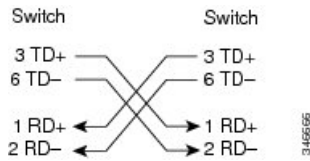


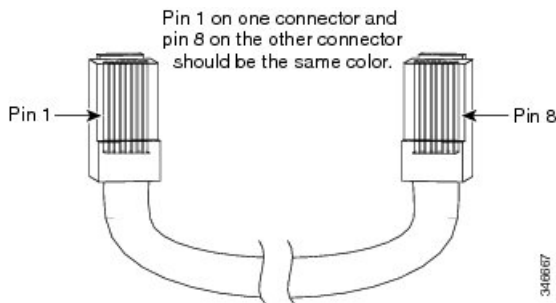
Figure 94: Two Twisted-Pair Crossover Cable Schematic



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 95: 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 30: 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 31: 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

- [Configuring the Switch Using the Web User Interface, on page 119](#)
- [Configuring the Switch Using the CLI, on page 119](#)

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 120](#).

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 for Catalyst 3850 Series Switches 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

- [19-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500 Series, on page 123](#)
- [19-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500 High Performance Series , on page 124](#)
- [23-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500 Series, on page 124](#)
- [23-Inch rack mount Accessory Kit for Cisco Catalyst 9500 High Performance Series , on page 124](#)
- [Extension Rails and Brackets for Four-Point Mounting for Cisco Catalyst 9500 Series, on page 125](#)
- [Extension Rails and Brackets for Four-Point Mounting for Cisco Catalyst 9500 High Performance Series, on page 125](#)

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

The 19-inch Rack Mount Accessory Kit for Cisco Catalyst 9500 Series 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
Number-8 Phillips flat-head 0.312" long screws	8
Number-10 pan-head 0.625" long screws	4
Ground lug	1
M4.0 x 8mm Phillips pan-head screws	2

19-Inch Rack Mount Accessory Kit for Cisco Catalyst 9500 High Performance Series

The 19-inch Rack Mount Accessory Kit for Cisco Catalyst 9500 High Performance Series 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
M4.0 x 8mm Phillips pan-head screws	2

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

The 23-inch Rack Mount Accessory Kit for Cisco Catalyst 9500 Series contains the following items:

Item	Quantity
23-inch mounting brackets	2
19-inch mounting brackets	2
Number-12 pan-head 0.50" long screws	8
Number-8 Phillips flat-head 0.312" long screws	16

23-Inch rack mount Accessory Kit for Cisco Catalyst 9500 High Performance Series

The 23-inch Rack Mount Accessory Kit for Cisco Catalyst 9500 High Performance Series contains the following items:

Item	Quantity
23-inch mounting brackets	2

Item	Quantity
Cable guides	2
Number-12 pan-head 0.50" long screws	4
M4.0 x 20mm Phillips pan-head screws (Black color)	2
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 9500 Series

The Extension Rails and Brackets for Four-Point Mounting Accessory Kit for Cisco Catalyst 9500 Series contains the following items:

Item	Quantity
Extension rails and brackets for four-point mounting	2 sets
19-inch mounting brackets	2
Number-8 Phillips flat-head 0.312" long screws	16
Number-10 pan-head 0.625" long screws	8
Number-12 pan-head 0.50" long screws	8

Extension Rails and Brackets for Four-Point Mounting for Cisco Catalyst 9500 High Performance Series

The Extension Rails and Brackets for Four-Point Mounting Accessory Kit for Cisco Catalyst 9500 High Performance Series 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

