Catalyst 6840-X Switch Series Hardware Installation Guide

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CONTENTS

Preface

This guide describes the hardware features of the Cisco Catalyst 6840-X switch. It describes the physical and performance characteristics of the switch, explains how to install a switch, and provides troubleshooting information.

This guide does not describe system messages that you might receive or how to configure your switch.

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.
Italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
`Courier` font	Terminal sessions and information the system displays appear in `courier` font.
`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.

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

Reader Alert Conventions

This document may use the following conventions for reader alerts:

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

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

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

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

Warning IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS

Related Documentation

Note Before installing or upgrading the switch, refer to the switch release notes.

- Catalyst 6840-X switch documentation at: http://www.cisco.com/c/en/us/support/switches/catalyst-6800-series-switches/tsd-products-support-series-home.html
- Cisco SFP and SFP+ modules documentation, including compatibility matrixes at: http://www.cisco.com/en/US/products/hw/modules/ps5455/tsd_products_support_series_home.html

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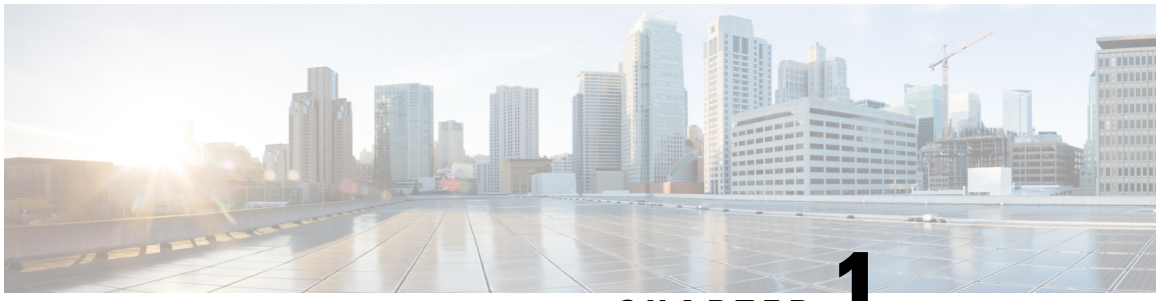


CHAPTER 1

Product Overview

The Catalyst 6840-X switch family consists of four fixed-aggregation switches supporting redundant power supplies. The chassis has 16/24/32/40 fixed 10-Gigabit SFP+, 1-Gigabit SFP, or 100BASE-FX SFP ports and also 40-Gigabit uplink ports on selected switch models.

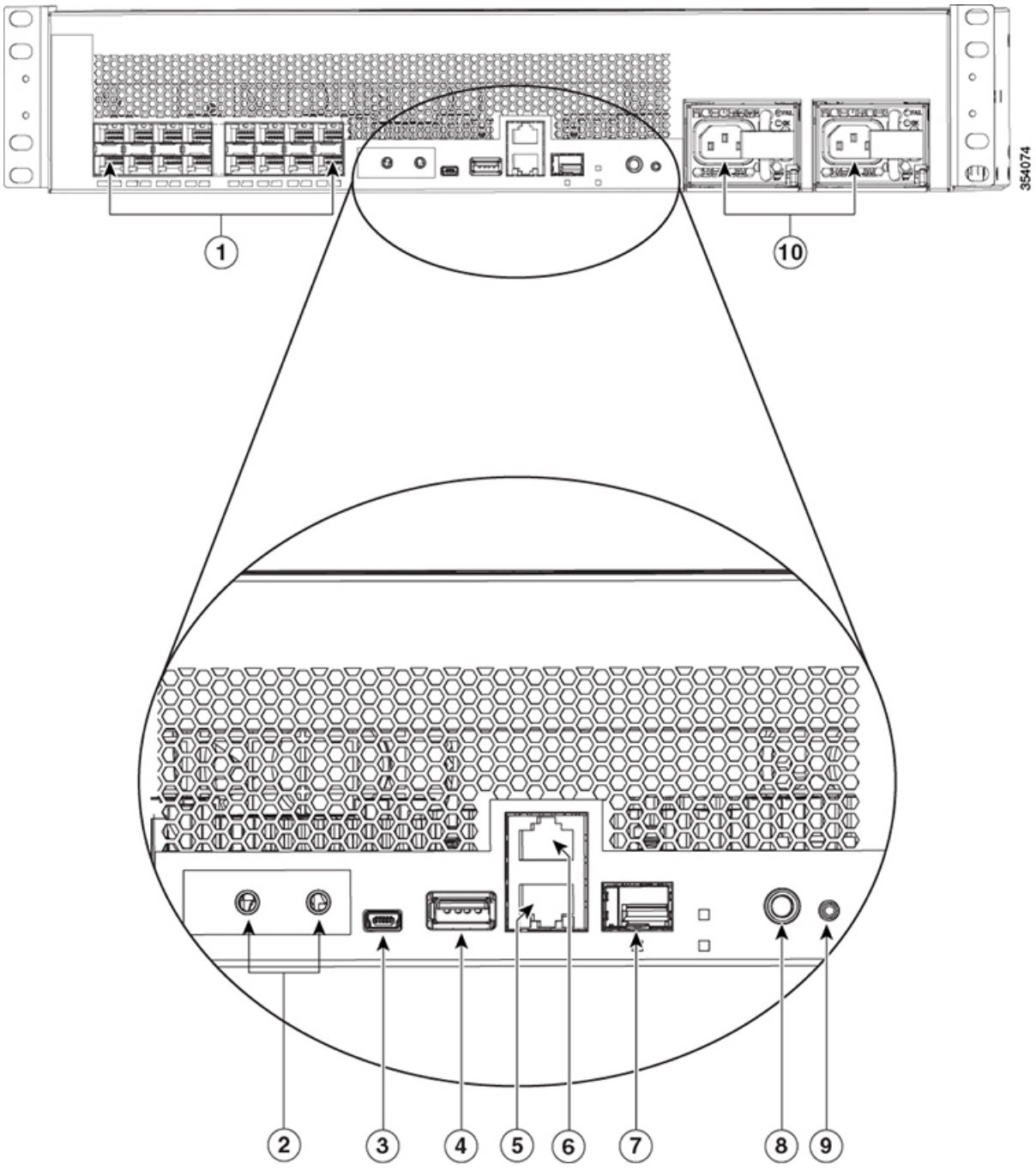
Switch Models

Table 1: Switch Models

Switch Model	Description
Catalyst 6816-X-LE	16 10-Gigabit SFP+ ports and two power supply slots
Catalyst 6832-X-LE	32 10-Gigabit SFP+ ports and two power supply slots
Catalyst 6824-X-LE-40G	24 10-Gigabit SFP+ports and two 40-Gigabit QSFP+ uplink ports, and two power supply slots
Catalyst 6840-X-LE-40G	40 10-Gigabit SFP+ and two 40-Gigabit QSFP+ uplink ports, and two power supply slots

Front Panel Components

Figure 1: Catalyst 6816-X-LE

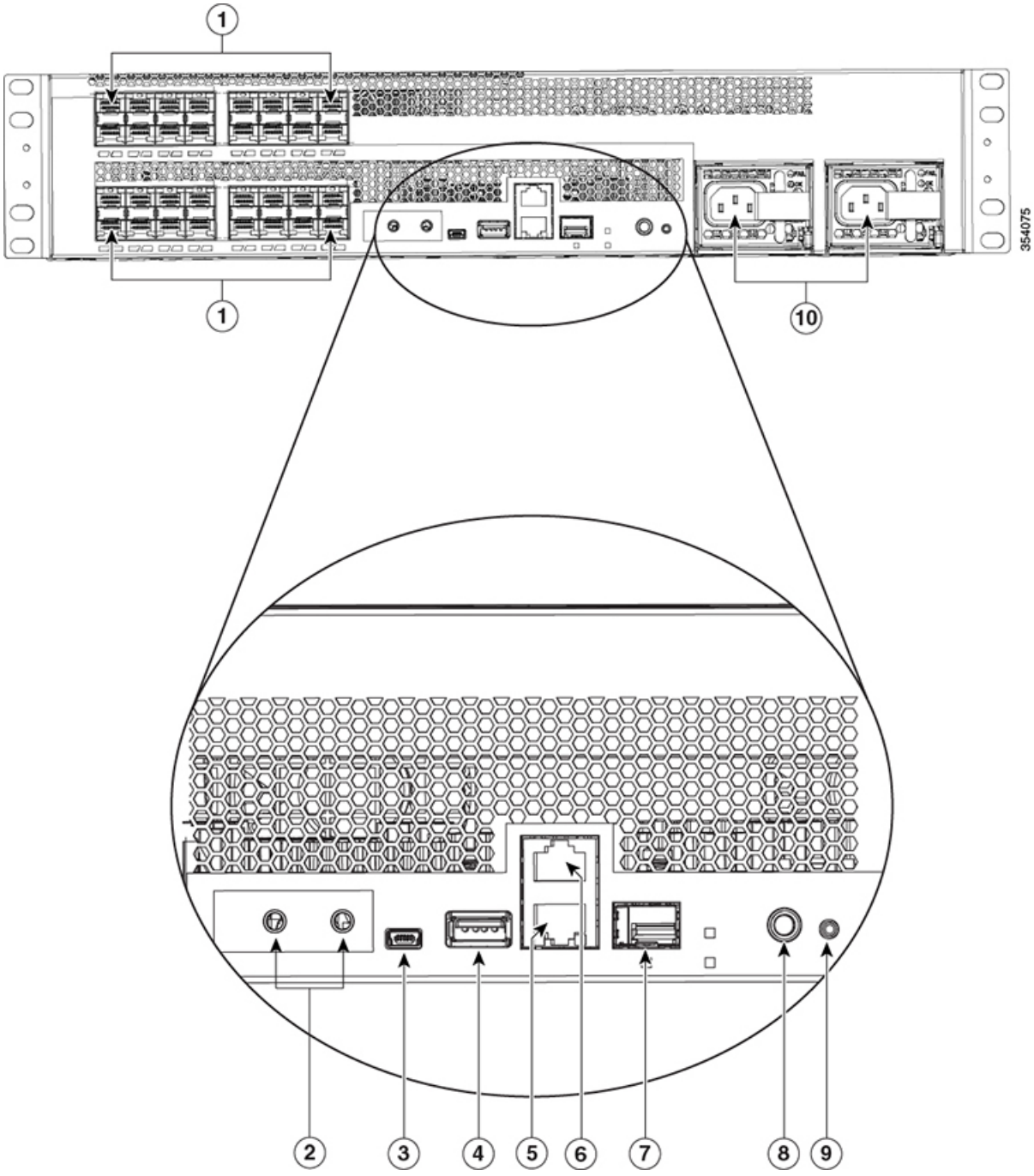


1	16 10G SFP+ ports or 100 MB or 1G SFP fiber-optic ports	6	Console port (RJ-45 Serial)

2	Grounding pad	7	Ethernet management SFP port
3	USB mini Type B console port	8	System ID (blue beacon LED)
4	USB Type A host port	9	Reset button
5	Ethernet management RJ-45 port	10	Two power supply slots [1]

[1] Power supplies that are ordered are installed in the switch. If the second power supply is not ordered, a blank panel is installed.

Figure 2: Catalyst 6832-X-LE

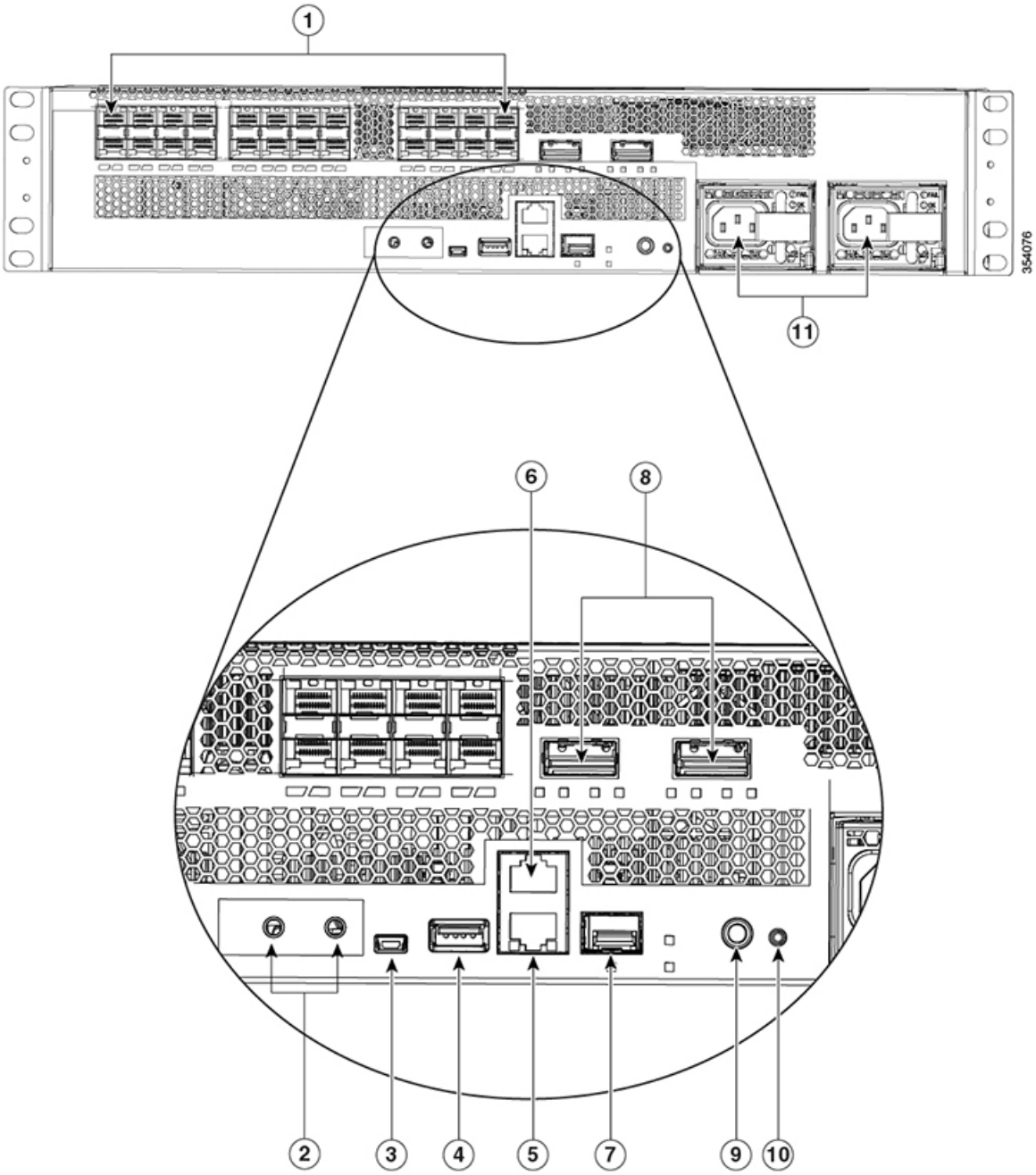


1	32 10G SFP+ ports or 100 MB or 1G SFP fiber-optic ports	6	Console port (RJ-45 Serial)
2	Grounding pad	7	Ethernet management SFP port

3	USB mini Type B console port	8	System ID (blue beacon LED)
4	USB Type A host port	9	Reset button
5	Ethernet management RJ-45 port	10	Two power supply slots [2]

[2] Power supplies that are ordered are installed in the switch. If the second power supply is not ordered, a blank panel is installed.

Figure 3: Catalyst 6824-X-LE-40G

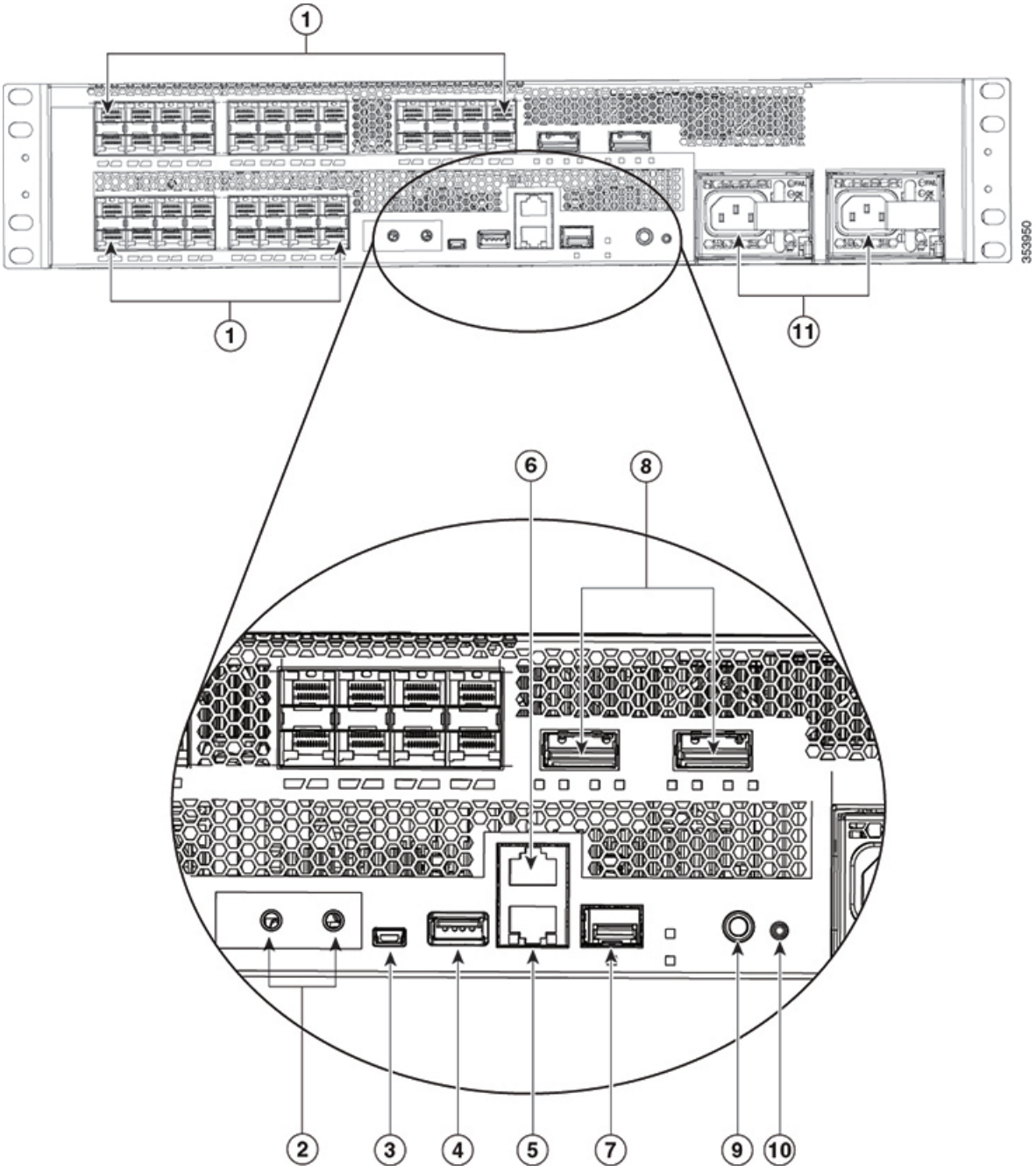


1	24 10G SFP+ ports or 100 MB or 1G SFP fiber-optic ports	7	Ethernet management SFP port
2	Grounding pad	8	Two 40G QSFP+ uplink ports

3	USB mini Type B console port	9	System ID (blue beacon LED)
4	USB Type A host port	10	Reset button
5	Ethernet management RJ-45 port	11	Two power supply slots [3]
6	Console port (RJ-45 Serial)		

[3] Power supplies that are ordered are installed in the switch. If the second power supply is not ordered, a blank panel is installed.

Figure 4: Catalyst 6840-X-LE-40G



1	40 10G SFP+ ports or 100 MB or 1G SFP fiber-optic ports	7	Two 40G QSFP+ uplink ports
2	Grounding pad	8	Ethernet management SFP port

3	USB mini Type B console port	9	System ID (blue beacon LED)
4	USB Type A host port	10	Reset button
5	Ethernet management RJ-45 port	11	Two power supply slots [4]
6	Console port (RJ-45 Serial)		

[4] Power supplies that are ordered are installed in the switch. If the second power supply is not ordered, a blank panel is installed.

SFP and SFP+ Transceiver Module Ports

The chassis contains 16/24/32/40 ports of 10-Gigabit Ethernet SFP+ or 100BASE-FX fiber-optic transceiver modules. All ports support 1-Gigabit SFP, 10-Gigabit SFP+, or 100BASE-FX fiber-optic SFP modules with two 40-Gigabit uplink ports on selected switch models.

The ports also support Cisco Trust Security (CTS) and virtual switch link (VSL) and can operate as an Instant Access (IA) Parent in both 1-Gigabit, 10-Gigabit modes and 40-Gigabit modes.

The SFP and SFP+ transceiver modules provide copper or fiber-optic connections to other devices. These transceiver modules are field-replaceable and provide the uplink interfaces when installed in an SFP module slot. The SFP transceiver modules have LC connectors for fiber-optic connections or RJ-45 connectors for copper connections.

For a list of supported SFP and SFP+ modules, see the switch data sheet: http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6800-series-switches/datasheet-c78-734470.html.

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 10-Gigabit and 40-Gigabit ports.

Catalyst 6816-X-LE

Figure 5: 10G native port numbering

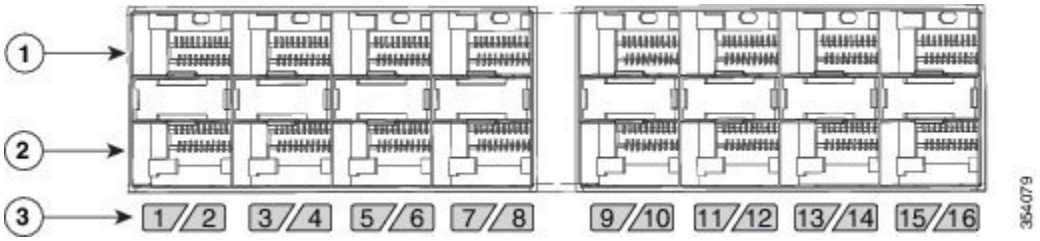


Table 2: Port mapping for Catalyst 6816-X-LE

10-Gigabit ports	Configurable 40-Gigabit ports[5]
1, 2, 3, and 4	17

10-Gigabit ports	Configurable 40-Gigabit ports[5]
5, 6, 7, and 8	18
9, 10, 11, and 12	19
13, 14, 15, and 16	20

[5] To configure 10G ports to function as 40G ports, you need to use adapter cables that connect four 10G SFP+ ports of the switch on one end to a 40G QSFP port of the switch on the other end.

Catalyst 6832-X-LE

Figure 6: 10G native port numbering

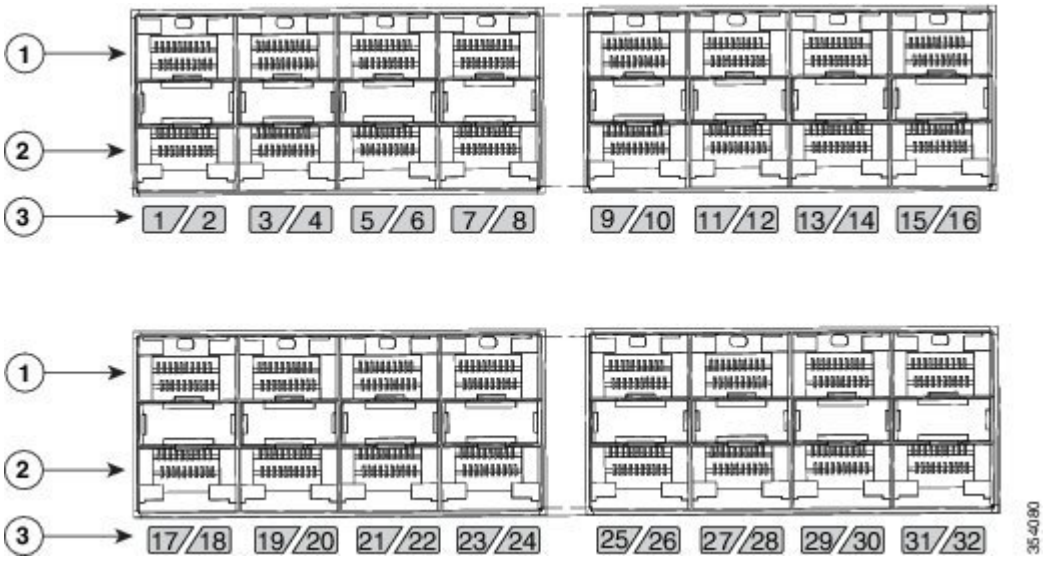


Table 3: Port mapping for Catalyst 6832-X-LE

10-Gigabit ports	Configurable 40-Gigabit ports [6]
1, 2, 3, and 4	33
5, 6, 7, and 8	34
9, 10, 11, and 12	35
13, 14, 15, and 16	36
17, 18, 19, and 20	37
21, 22, 23, and 24	38
25, 26, 27, and 28	39
29, 30, 31, and 32	40

[6] To configure 10G ports to function as 40G ports, you need to use adapter cables that connect four 10G SFP+ ports of the switch on one end to a 40G QSFP port of the switch on the other end.

Catalyst 6824-X-LE-40G

Figure 7: 10G native port numbering

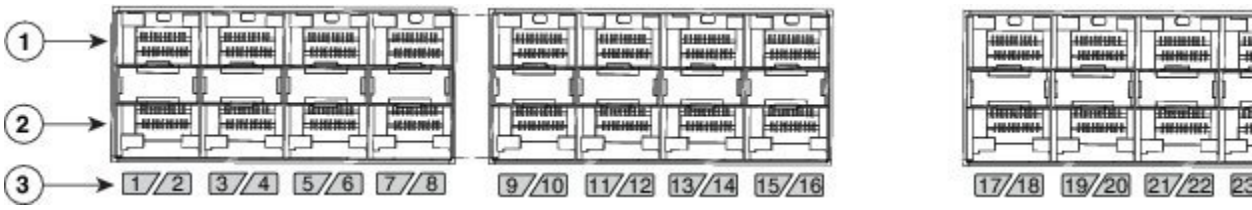


Table 4: Port mapping for Catalyst 6824-X-LE

10-Gigabit ports	Configurable 40-Gigabit ports [7]
1, 2, 3, and 4	35
5, 6, 7, and 8	36
9, 10, 11, and 12	37
13, 14, 15, and 16	38
17, 18, 19, and 20	39
21, 22, 23, and 24	40

40-Gigabit native ports	Configurable 10-Gigabit ports [8]
25	27, 28, 29, and 30
26	31, 32, 33, and 34

[7] To configure 10G ports to function as 40G ports, you need to use adapter cables that connect four 10G SFP+ ports of the switch on one end to a 40G QSFP port of the switch on the other end.

[8] To configure 40G ports to function as 10G ports, you need to use 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.

Catalyst 6840-X-LE-40G

Figure 8: 10G native port numbering

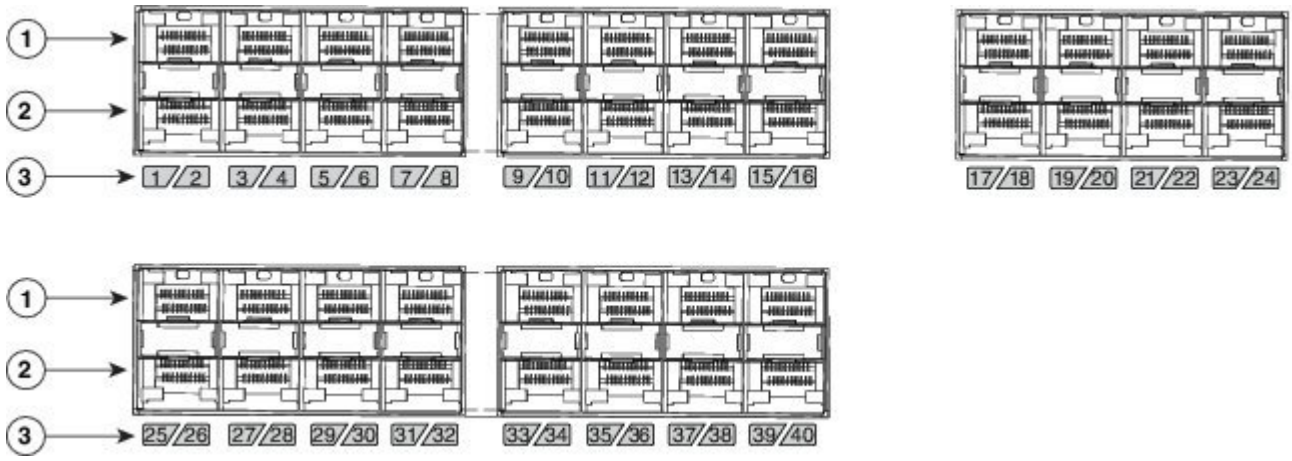


Table 5: Port mapping for Catalyst 6840-X-LE

10-Gigabit ports	Configurable 40-Gigabit ports [9]
1, 2, 3, and 4	51
5, 6, 7, and 8	52
9, 10, 11, and 12	53
13, 14, 15, and 16	54
17, 18, 19, and 20	55
21, 22, 23, and 24	56
25, 26, 27, and 28	57
29, 30, 31, and 32	58
33, 34, 35, and 36	59
37, 38, 39, and 40	60

40-Gigabit native ports	Configurable 10-Gigabit ports[10]
41	43, 44, 45,, and 46
42	47, 48, 49, and 50

9 To configure 10G ports to function as 40G ports, you need to use adapter cables that connect four 10G SFP+ ports of the switch on one end to a 40G QSFP port of the switch on the other end.

10 To configure 40G ports to function as 10G ports, you need to use 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.

Power Supply Slots

The chassis has two power supply slots that accept either AC-input or DC-input power supplies, or one of each. The chassis is delivered with power supplies pre-installed in the power supply slots. 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.

Table 6: Power supplies supported by the switches

Switch	Power Supply
Catalyst 6816-X-LE	750W and 1100W
Catalyst 6832-X-LE	750W and 1100W
Catalyst 6824-X-LE-40G	750W and 1100W
Catalyst 6840-X-LE-40G	1100W **Note** If you insert a 750W power supply in to the power supply slot of a Catalyst 6840-X-LE-40G switch, the switch fails to boot.

Related Topics

Front Panel Components

Management Port

The management port is a 10/100/1000 copper Ethernet port directly connected to the route processor. The switch also has a fibre port that can be used as the Ethernet Management port. It supports TFTP image downloading, network management, SNMP, Telnet, and SSH connections. Flexible NetFlow export is not supported on the management port. The management port is isolated from other ports in the system in a dedicated management VRF; it is not part of the EARL forwarding logic. The management port provides direct access to the CPU, even when the system is heavily loaded.

The management port is a Layer 3 port in host mode, and only accepts traffic that terminates on the router. This port does not route packets between itself and other ports. The port processes only the following packet types and properly enqueues them:

- Address Resolution Protocol (ARP)
- IPv4 unicast
- IPv6 unicast
- Cisco Discovery Protocol (CDP)
- Link Layer Discovery Protocol (LLDP)

Related Topics

Front Panel Components

Mini USB Type B Console Port

The Mini USB 2.0 Type B console port functions as a second console connection to the route processor. The USB console port connection uses a Mini USB 2.0 cable. The USB console interface speed is same as the RJ-45 console interface speed.

Windows computers require a driver for the USB port. Before using the USB port, you must download the required driver to your computer from https://software.cisco.com/download/release.html?mdfid=282979369&softwareid=282855122&release=3.1

By default, USB-prefer mode is enabled for the port; but it can be overridden using the command-line interface (CLI). When this port is in the USB-prefer mode, the RJ-45 console port will be disabled, if both the ports are connected. For more information on using the CLI to configure the USB console interface, see the *Catalyst 6500 Software Configuration Guide*.

Related Topics

Front Panel Components

USB Type A Port

The USB 2.0 Type A port (disk0) is the only external storage interface for this switch. The port is connected to the route processor, which allows the Cisco IOS software to access the port. The port supports Cisco USB flash drives with capacities from 128 MB to 8 GB (USB devices with port densities of 128 MB, 256 MB, 1 GB, 4 GB, and 8 GB are supported). Cisco IOS software provides standard file system access to the flash device: read, write, erase, and copy. The software also provides the ability to format the flash device with a FAT file system (FAT32 and FAT16).

Related Topics

Front Panel Components

Console Port

The console port is an RJ-45 port that provides universal asynchronous receiver/transmitter (UART) support to access the route processor with a serial console running at 9600 baud rate with 8 bits for data, no parity bit, and 1 stop bit.

Related Topics

Front Panel Components

System Reset Button

This recessed access button is used to reset the system. Pressing the button brings down the route processor.

Related Topics

Front Panel Components

Fan Tray

The fan tray is responsible for cooling the entire chassis and interfacing with environmental monitors to trigger alarms when conditions exceed thresholds. The fan tray supports Online Insertion and Removal (OIR).

The fan tray contains four high-efficiency fans with variable speed settings and thermal sensors. If one fan fails, the speed of the others is increased and a minor alarm is triggered. If a major fan tray failure occurs, the system is shut down. The individual fans are not field replaceable; the entire fan tray must be replaced in the event of a major fan tray failure. See Removing the Fan Tray, on page 61 for additional information about the fan.

Related Topics

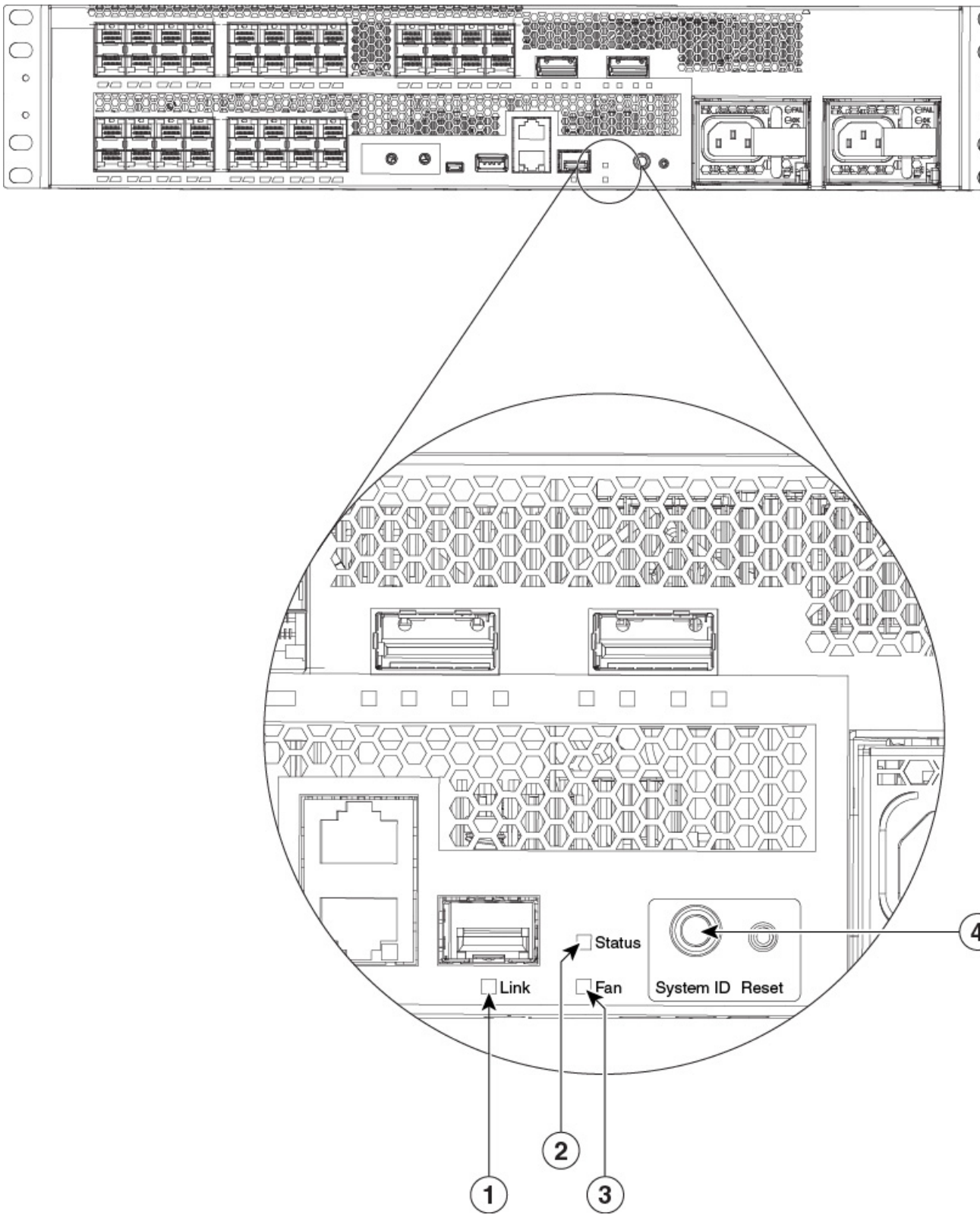
Front Panel Components

Fan Tray LED, on page 17

LED Indicators

You can use the switch LEDs to monitor switch activity and performance. You can also monitor the status of the fan tray assembly, and the power supplies.

Figure 9: Status, Fan, and System ID LEDs



Status LED

The status LED indicates the status of the system.

Table 7: Status 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.

System ID LED

The System ID (blue beacon) LED can be provisioned by the operator to indicate that the switch needs attention.

Table 8: System ID LED Indicator

Color/State	Description
Blinking blue	The system needs attention.

Management Port LED

This table describes the management port LEDs.

Table 9: Management Port LED Indicator

Color/State	Description
Off	Port is not provisioned.
Amber	Port is provisioned, but administratively not operational.
Green	Port is linked up.
Alternating green and amber	A port fault is detected, or the port beacon has been provisioned by the operator.

Fan Tray LED

The Fan LED is located on the front panel of the switch. The following image depicts the Fan LED, the system status LED, and the blue beacon LED on the front panel of the switch.

Table 10: Fan LED Indicator

Color/State	Description
Off	The fan tray is not receiving power; the fans have stopped.
Green	All fans are operating normally.
Amber	The fan tray has a failure.

Related Topics

Fan Tray, on page 14

Power Supply LEDs

The power supply includes LEDs on the front of the module. The different states of the LEDs are described in the following table.

Figure 10: Power Supply LED

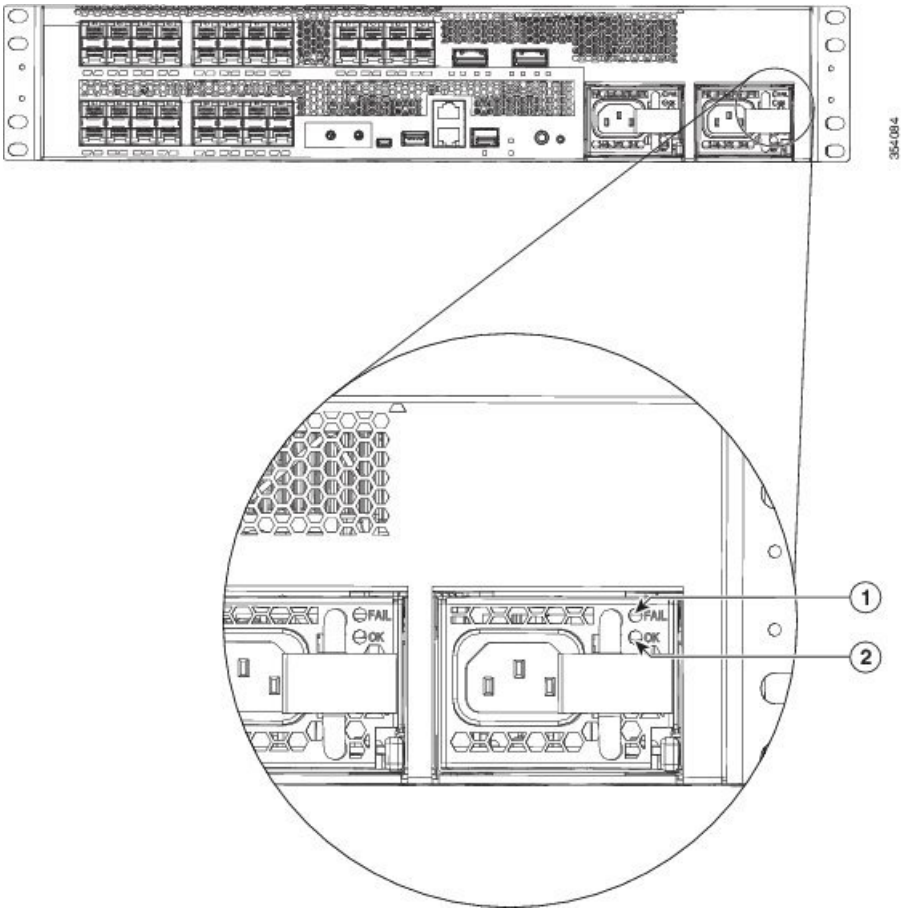
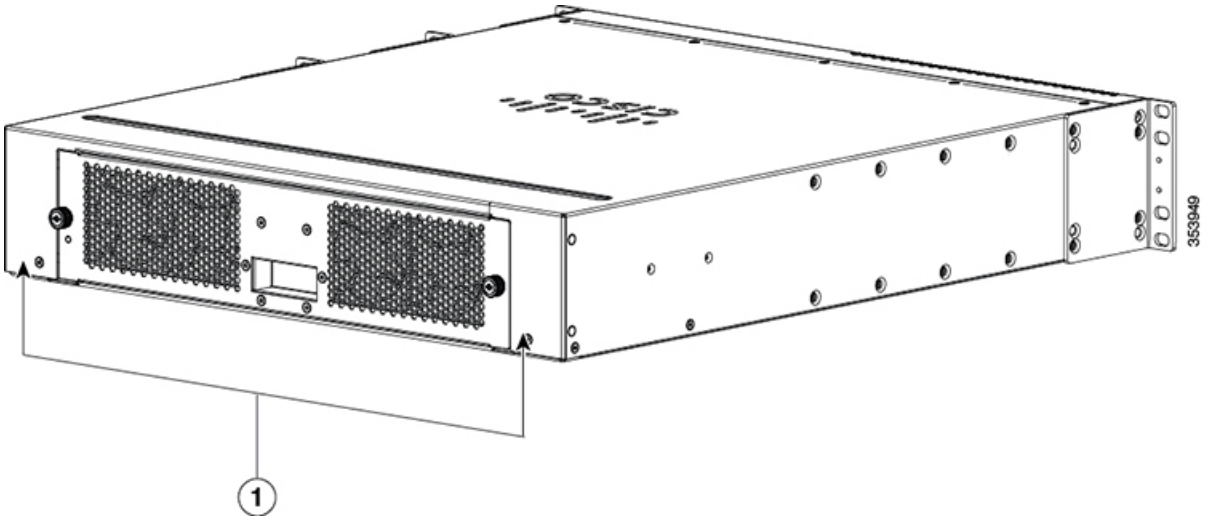


Table 11: Power Supply LED Indicators

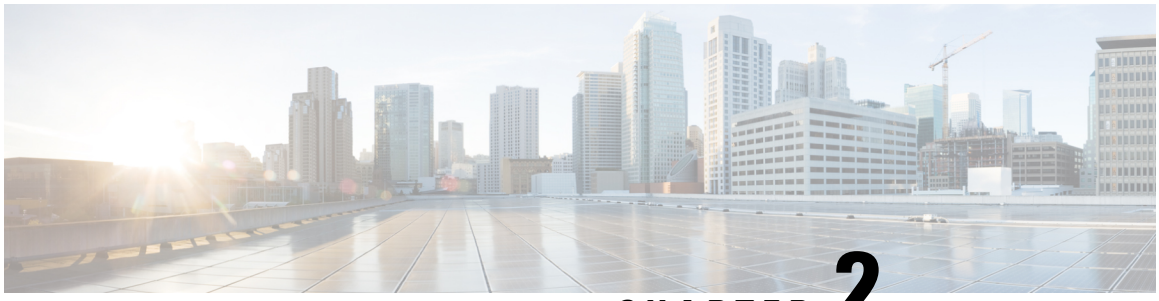
AC Power Supply Condition	OK LED (Green)	FAIL LED (Amber)
No AC power to the power supplies.	Off	Off
Power supply failure, including over voltage, over current, over temperature, and fan failure conditions.	Off	ON
Power supply needs attention, activated for events like high temperature, high power or slow fan.	Off	Blinking
Input AC is present, 3.3 voltage standby (VSB) is on and the power supply unit is switched off.	Blinking	Off
Power supply is on and operates normally.	On	Off

Rear Panel

Figure 11: Rear Panel



1	Fan trays



CHAPTER 2

Preparing for Installation

Safety Warnings

Safety warnings appear throughout this publication in procedures that might harm you if performed incorrectly. The warnings below are general warnings that are applicable to the entire publication.

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

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

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

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 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 the system has been exposed to abnormally cold temperatures, allow a 2-hour warm-up period to bring it to normal operating temperature before turning it 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 baseboard and other boards in the chassis, any installed modules, and power supplies. Any constraints placed on the free flow of air through the chassis or an elevated ambient air temperature can cause the switch to overheat and shut down.

To maintain proper air circulation through the switch chassis, maintain a minimum 6-inch (15 cm) separation between a wall and the chassis air intake or a wall and the chassis hot air exhaust. In situations where the switch chassis is installed in racks which are placed in parallel rows, you should allow a minimum 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 can 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 there is a minimum of 6 inches (15 cm) of clearance between the sides of the rack and both the chassis air intake grill and the chassis air exhaust grill.
- 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 and at the chassis air exhaust grill by positioning an external temperature probe approximately 1 inch (2.5 cm) away from the grills.
- If the ambient intake air temperature is less than 104°F (40°C), the rack meets the intake air temperature criterion.
    - If the ambient intake air temperature exceeds 104°F (40°C), the system might experience minor temperature alarms and is in danger of overheating.
    - If the ambient intake air temperature equals or is greater than 131°F (55°C), the system will experience a major temperature alarm and shut down.
- Verify that the enclosed or partially enclosed rack allows an adequate flow of air through the switch chassis as follows:
    - If the difference between the measured intake air temperature and the exhaust air temperature does not exceed 10°C, there is sufficient airflow in the rack.
    - If the difference in air temperature exceeds 10°C, there is insufficient airflow to cool the chassis.

Note The 10°C temperature differential between the intake and the exhaust must be determined by taking measurements using external digital temperature probes. Do not use the chassis internal temperature sensors to measure the temperature differential.

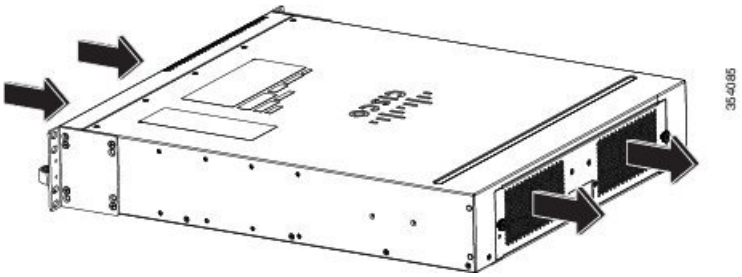
- Plan ahead. Your switch that is installed in an enclosed or partially enclosed rack might currently meet ambient air temperature and air flow requirements. However, if you add more chassis to the rack or you add more modules to a chassis in the rack, the additional heat generated might cause the ambient air temperature within the rack to exceed 104°F (40°C) and can cause minor alarms.

Cooling with the Fan Tray

The chassis fan tray provides cooling air for the switch chassis and components. If an individual fan within the fan tray fails, the Fan Status LED turns amber. Individual fans within a fan tray cannot be replaced; you must replace the entire fan tray.

Refer to your software configuration guide for information on environmental monitoring.

Figure 12: Catalyst 6840-X Switch Internal Air Flow



Related Topics

Installing the Fan Tray, on page 62

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 to operate at 5 to 90 percent relative humidity, with a humidity gradation of 10 percent per hour. In storage, a system can withstand 5 to 95 percent relative humidity. 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

Corrosion

Corrosion of system connectors is a gradual process that may eventually lead to intermittent failures of electrical circuits. The oil from a person's fingers or prolonged exposure to high temperature or humidity may corrode the gold-plated edge connectors and pin connectors on various components in the system. To prevent corrosion,

avoid touching contacts on boards and cards, and protect the system from extreme temperatures and moist, salty environments.

EMI and Radio Frequency 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 EMI and RFI 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 with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.

Caution Category 5e, Category 6, and Category 6a cables can store large levels of static electricity because of the dielectric properties of the materials used in their construction. Always ground the cables (especially in new cable runs) to a suitable and safe earth ground before connecting them to the module.

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.

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 cables 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

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 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 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.

Caution Category 5e, Category 6, and Category 6a cables can store large levels of static electricity because of the dielectric properties of the materials used in their construction. Always ground the cables (especially in new cable runs) to a suitable and safe earth ground before connecting them to the module.

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.
- 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.
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.
- 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 the Cisco Technical Assistance Center or a local electrician.
- Use approved power cables only. You have been provided with one or more power cables with your chassis power supply that are intended for use in your country, based on the shipping location. Should you need to purchase additional power cables, ensure that they are rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the power cable should be greater than the ratings marked on the label.
- 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 Electrostatic Discharge Damage

To prevent ESD damage, follow these guidelines:

- Always use an ESD wrist strap and ensure that it makes maximum contact with bare skin. ESD grounding straps are available with banana plugs, metal spring clips, or alligator clips. All switch chassis are equipped with a banana plug connector (identified by the ground symbol next to the USB port) somewhere on the front panel. If you have an older chassis equipped with a plastic banana plug connector, it is recommend that you use either the supplied ESD grounding wrist strap (with a metal clip) or an ESD grounding wrist strap equipped with an alligator clip. If you have a newer chassis that has a bare metal hole as the banana plug connector (also identified by the ground symbol next to the USB port), we recommend that you use a personal ESD grounding strap equipped with a banana plug.
- If you choose to use the disposable ESD wrist strap supplied with most FRUs or an ESD wrist strap equipped with an alligator clip, you must attach the system ground lug to the chassis in order to provide a proper grounding point for the ESD wrist strap.
- If your chassis does not have the system ground attached, you must install the system ground. See Establishing the System Ground, on page 45 for installation instructions and locations of the chassis system ground pads.

Attaching the ESD Wrist Strap

After you install the system ground lug, follow these steps to correctly attach the ESD wrist strap:

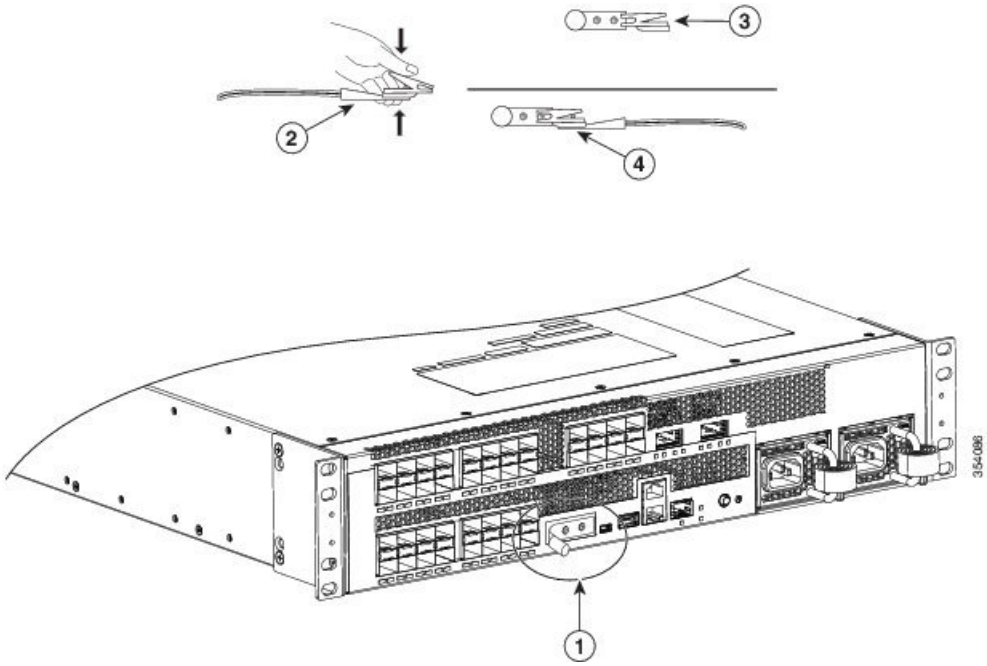
Procedure

Step 1 Secure the ESD wrist strap equipped with an alligator clip to your bare skin.

Step 2 Grasp the spring or alligator clip on the ESD wrist strap and momentarily touch the clip to a bare metal spot (unpainted surface) on the rack. It is recommend that you touch the clip to an unpainted rack rail so that any built-up static charge is then safely dissipated to the entire rack.

Step 3 Attach the alligator clip directly over the head of the system ground lug screw or to the system ground lug barrel.

Figure 13: Attaching the ESD Wrist Strap to the System Ground Lug Screw



1	System ground lug	3	Alligator clip
2	ESD wrist strap	4	Clip attached to the system ground lug

Power Requirements

When preparing your site for the switch installation, follow these requirements:

- When installing two power supplies, connect each power supply to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.
- To prevent a loss of input power, be sure that the total maximum load on each source circuit is within the current ratings of the wiring and breakers.
- You might decide to use an uninterruptible power supply (UPS) to protect against power failures at your site. Be aware when selecting a UPS that some UPS models that use ferroresonant technology can become unstable when operating with the switch power supplies which use power factor correction (PFC). This

can cause the output voltage waveform to the switch to become distorted resulting in an undervoltage situation in the system.

- The AC-input power supply has a detachable power cord that allows you to connect each power supply to the site power source.
- Plug the DC wiring connector into the inlet receptacle at the rear of the chassis. For a DC installation, you should secure the plug to the power supply by tightening both captive screws on the plug.
- If you are using a 200/240 VAC power source in North America, the circuit must be protected by a two-pole circuit breaker.
- The source AC outlet must be within 6 feet (1.8 meters) of the system and should be easily accessible.
- The AC power receptacles used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground at the service equipment.

Power Connection Guidelines for AC-Powered Systems

This section provides the basic guidelines for connecting the switch AC power supplies to the site power source:

- Each chassis power supply should have a separate, dedicated branch circuit.
- For North America:
  - The 1100 W power supply requires a 10 A circuit, if the voltage is 110V.
- For International:
  - Circuits should be sized according to local and national codes.
- If you are using a 200/240 VAC power source in North America, the circuit must be protected by a two-pole circuit breaker.
- The source AC outlet must be within 6 feet (1.8 meters) of the system and should be easily accessible.
- The AC power receptacles used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground at the service equipment.

Power Connection Guidelines for DC-Powered Systems

This section provides the basic guidelines for connecting the switch DC-input power supplies to the site power source:

- All power connection wiring should conform to the rules and regulations in the National Electrical Code (NEC), as well as any local codes.
- The DC return must remain isolated from the system frame and the chassis (DC-I).
- For DC power cables, we recommend that you use commensurately rated, high-strand-count copper wire cable. Connection to the DC-input power supply requires one earth ground cable, one source DC (–), and one source DC return (+). The length of the cables depends on your switch location. These cables are not available from Cisco Systems. They are available from any commercial cable vendor.

- The color coding of the source DC power cable leads depends on the color coding of the site DC power source. Typically, green or green and yellow indicate that the cable is a ground cable. Because there is no color code standard for source DC wiring, you must ensure that the power cables are connected to the DC-input power supply terminal block in the proper (+) and (–) polarity. In some cases, the source DC cable leads might have a positive (+) or a negative (–) label. This label is a relatively safe indication of the polarity, but you must verify the polarity by measuring the voltage between the DC cable leads. When making the measurement, the positive (+) lead and the negative (–) lead must always match the (+) and (–) labels on the DC-input power supply.
- The circuit breaker is considered to be the disconnect device and should be easily accessible.
- The circuit must be protected by a dedicated two-pole circuit breaker. The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- For proper DC-input redundant power configurations on systems with multiple-input DC-input power supplies, all pairs of source DC cables for one DC-input power supply must come from the same battery system (A feed); all pairs of source DC cables for the second DC-input power supply must come from a different battery system (B feed).
- For DC-input power supplies with multiple inputs, each DC input must be protected by a dedicated circuit breaker or a fuse. The circuit breaker or the fuse must be sized according to the power supply input rating and local or national electrical codes.

Cabling Requirements

When running power and data cables together in overhead cable trays or subfloor cable trays, be aware of the following caution:

Caution We strongly recommend that power cabling runs and other potential noise sources be located as far away as practical from LAN cabling that terminates on Cisco equipment. In situations where this type of long parallel cable runs exist and cannot be separated by at least 3.3 feet (1 meter), we recommend that you shield these potential noise sources. To avoid interference, the source should be shielded by housing it in a grounded metallic conduit.

Also be aware of the following caution concerning the use of Category 5e and Category 6 Ethernet cables:

Caution Category 5e, Category 6, and Category 6a cables can store large levels of static electricity because of the dielectric properties of the materials used in their construction. Always ground the cables (especially in new cable runs) to a suitable and safe earth ground before connecting them to the module.

Site Preparation Checklist

The following table lists the site-planning activities that you should perform prior to installing the switch. Completing each activity helps ensure a successful switch installation.

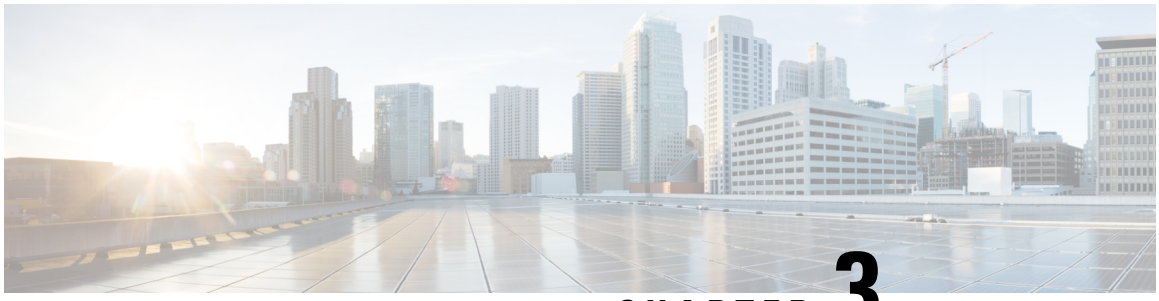
Table 13: Site-Planning Activities

Task No.	Activity	Verified By	Time and Date
1	Space evaluation: • Space and layout • Floor covering • Impact and vibration • Lighting • Maintenance access		
2	Environmental evaluation: • Ambient temperature • Humidity • Altitude • Atmospheric contamination • Airflow		
3	Power evaluation: • Input power type • Power receptacles (Depends on power supply) • Receptacle proximity to the equipment • Dedicated (separate) circuits for redundant power supplies • UPS for power failures • DC systems: Proper gauge wire and lugs		
4	Grounding evaluation: • Circuit breaker size • CO ground (AC- and DC-powered systems)		

Task No.	Activity	Verified By	Time and Date
5	Cable and interface equipment evaluation: • Cable type • Connector type • Cable distance limitations • Interface equipment (transceivers)		
6	EMI evaluation: • Distance limitations for signaling • Site wiring • RFI levels		

Note For power receptacles (depends on power supply), verify that each power supply installed in the chassis has a dedicated AC source or DC source circuit.

Note For UPS for power failures, refer to the power supply's kVA rating as a sizing criteria in determining the output required by the UPS.



CHAPTER 3

Installing the Switch

This chapter describes how to install Catalyst 6840-X switches. Pointers within the overall chassis installation procedures point to separate installation procedures that cover installing various components and assemblies.

Installation Tasks

The process of installing the switch can be broken down into a series of tasks, which are described in the following table.

Task	Description
Unpacking the switch	Remove the switch from the packaging materials. **Note** Save the packaging material for later use if you need to move the chassis.
Installing the switch	Install the switch.
Connecting the chassis to system ground	Construct and attach a system ground wire from the building (earth) ground to the system ground point on the chassis.
Installing and cabling the power supply or supplies	Power supplies that are ordered with the switch are installed in the switch. If ordered separately, install the power supplies. Connect the power supplies.

Task	Description
Cabling the chassis and modules to the network	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.

Safety Warnings

Warning Class 1 laser product. Statement 1008

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

Warning 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 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 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

Before starting the installation procedures in this chapter, see the "Site Preparation Checklist" section on page 2-15 to verify that all site planning activities were completed.

Rack-Mounting Guidelines

Note The switch is designed to be installed in standard 19-inch racks.

Before rack-mounting the switch, ensure that the equipment rack complies with the following guidelines:

- The width of the rack, measured between the two front-mounting strips or rails, must be one of the following measurements:
  - 17.5 inches (44.45 cm)
  - 17.75 inches (45.09 cm)
- The depth of the rack, measured between the front- and rear-mounting strips, must be at least 19.25 inches (48.9 cm).
- The rack must have sufficient vertical clearance to insert the chassis: 8.75 inches (22.23 cm) (5 RU)

Note Chassis height is sometimes measured in rack units (RU or just U) where 1 RU or 1 U equals 1.75 in (44.45 mm). A typical server rack is 42 RU or 42 U in height.

Caution If the rack is on wheels, ensure that the brakes are engaged and that the rack is stabilized.

Warning Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over. Statement 1048

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

Note To maintain proper air circulation through the Catalyst switch chassis, you should maintain a recommended separation of a minimum of 6 inches (15 cm) between a wall and the chassis air intake or a wall and the chassis air exhaust. You should also allow a minimum separation of 12 inches (30.5 cm) between the hot air exhaust on one chassis and the air intake on another chassis. Failure to maintain adequate air space can cause the chassis to overheat and the system to fail.

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.

Chassis Installation Kits and Cable Guides

The chassis ships with an accessory kit, which includes chassis installation kits and cable guides:

- Standard 19-inch rack-mount L brackets (factory-installed on the chassis). Associated rack-mounting hardware is included in the accessory kit.
- Two cable management guides are included in the accessory kit.

Installing the Switch Chassis

Installation Accessory Kits

The switch chassis is designed to be installed in a standard 19-inch rack, either open or enclosed. The chassis is shipped with the 19-inch rack-mount L brackets that are factory installed on the left-front and right-front of the chassis. Screws are included with the accessory kit that are used to secure the chassis in the rack enclosure.

Note Depending on the manufacturer, the rack posts might be prethreaded to accept either 10-32 or 12-24 screws. If the rack posts are not prethreaded, you must install 10-32 or 12-24 clip nuts or cage nuts to secure the rack-mount screws. The clip nuts or the cage nuts are not included as part of the accessory kit and must be obtained on your own.

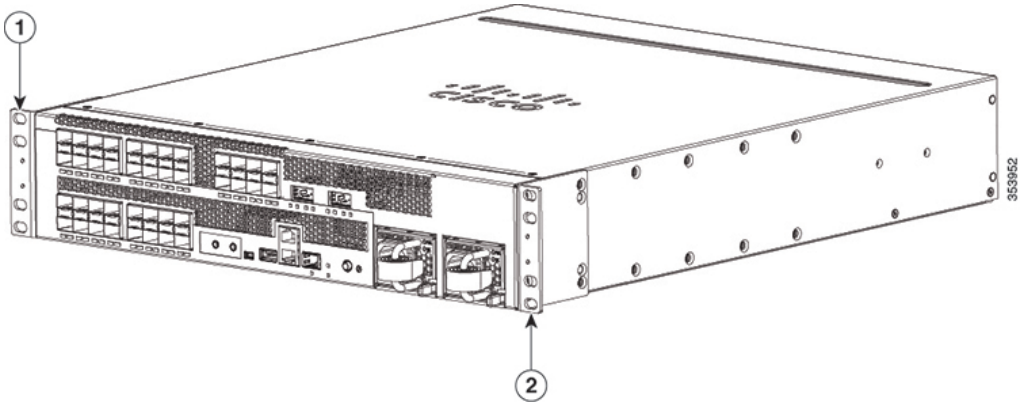
The accessory kit also contains the following:

- Cable guides— Two cable guides can be installed on the front of the chassis using the same sets of screws that secure the chassis rack-mount brackets to the rack posts.

L Brackets on the Chassis

The switch chassis is shipped with two L brackets installed toward the front of each side of the chassis, as shown in the following figure.

Figure 14: Brackets on the Switch Chassis



1	Left L bracket	2	Right L bracket

Installing the L Brackets in a rack

Note In many older equipment racks, the rack posts are prethreaded to accept either 10-32 or 12-24 screws. Newer rack enclosure posts might not be prethreaded. These rack enclosure posts require that you install 10-32 or 12-24 clip nuts or cage nuts to secure the rack-mount screws. The clip nuts or the cage nuts are not included as part of the accessory kit and must be obtained on your own.

Before you install the shelf brackets, determine the clearance between the insides of the left and right rails of your rack system:

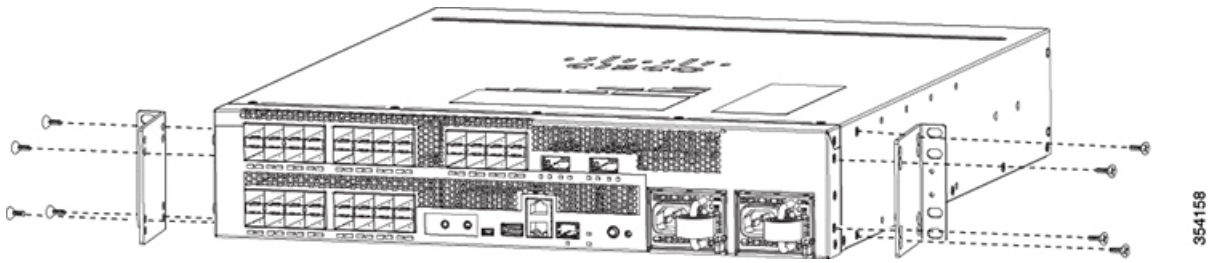
- If the distance between the insides of the rails is 17.5 inches (44.45 cm), then follow the steps in Installing the L Brackets on a Rack with 17.5 in. (44.45 cm) Opening, on page 40.
- If the distance between the insides of the rails is 17.75 inches (45.09 cm), then follow the steps in Installing the L Brackets on a Rack with 17.75 in. (45.09 cm) Opening, on page 41.

Installing the L Brackets on a Rack with 17.5 in. (44.45 cm) Opening

Procedure

Step 1 Attach the L bracket to the chassis as shown in the following figure.

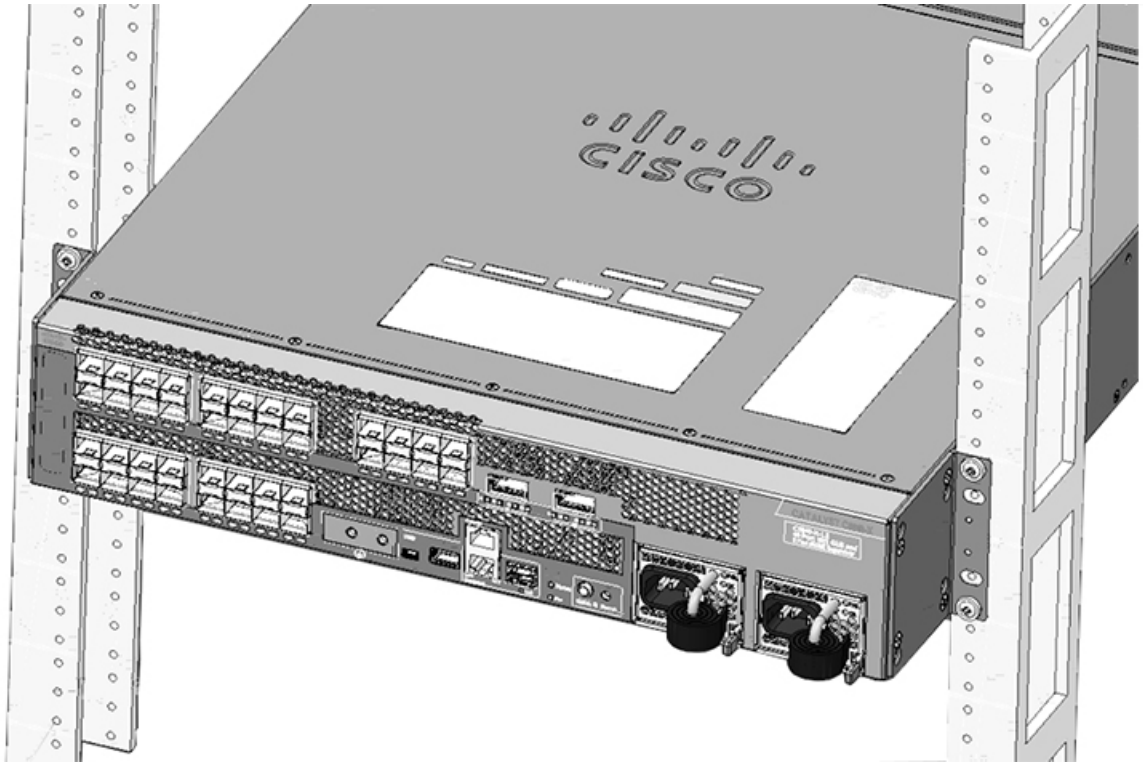
Figure 15: Attaching the L Bracket to the chassis



Step 2 Position the chassis in the rack and align the mounting holes in the L bracket with the mounting holes in the equipment rack.

Step 3 Secure the chassis using four screws through the holes in the L bracket and into the rack post holes.

Figure 16: Installing the chassis on a Rack with a 17.5 in. (44.45 cm) Opening

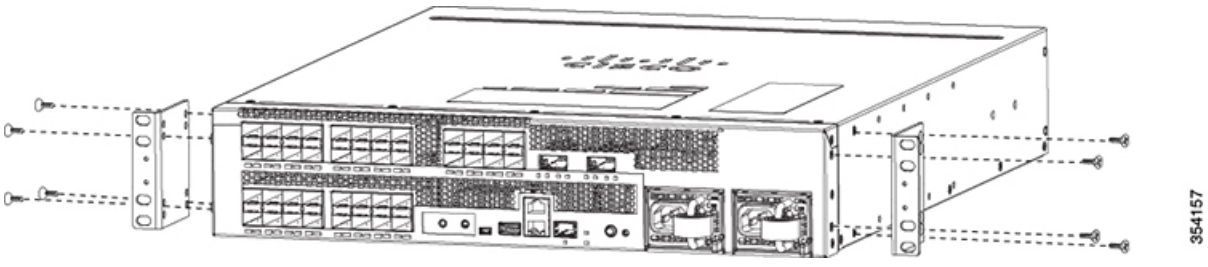


Installing the L Brackets on a Rack with 17.75 in. (45.09 cm) Opening

Procedure

Step 1 Attach the L bracket to the chassis as shown in the following figure.

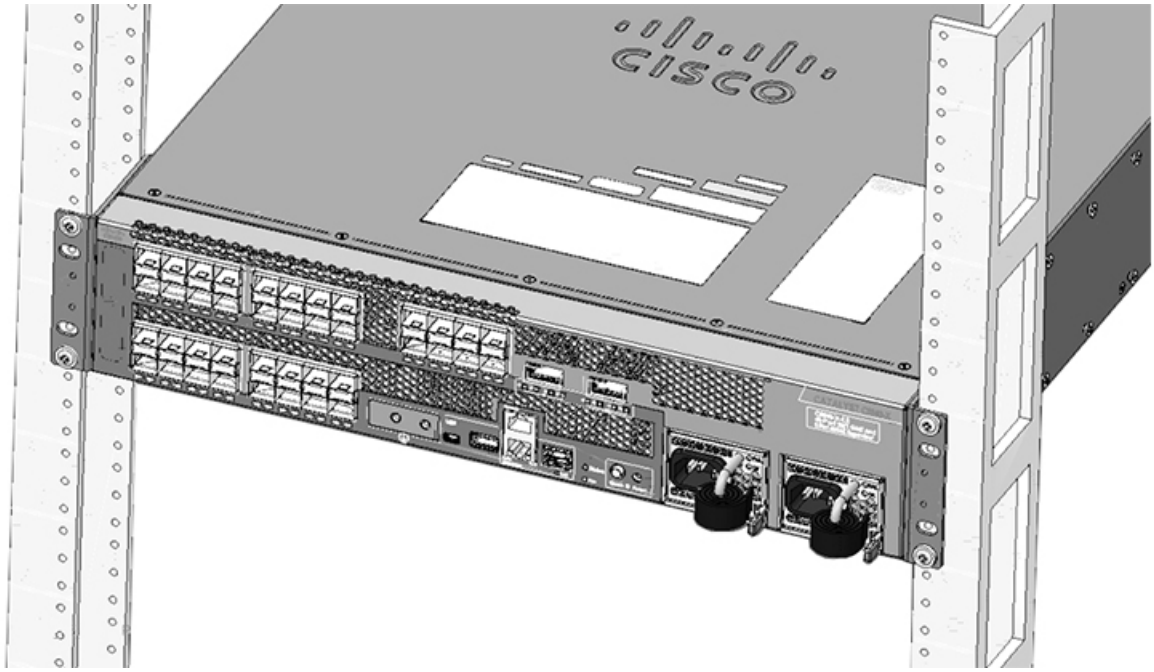
Figure 17: Attaching the L Bracket to the chassis



Step 2 Position the chassis in the rack and align the mounting holes in the L bracket with the mounting holes in the equipment rack.

Step 3 Secure the chassis using four screws through the holes in the L bracket and into the rack post holes.

Figure 18: Installing the chassis on a Rack with a 17.75 in. (45.09 cm) Opening



Installing the Chassis in a Two-Post Rack

Note The chassis are designed to be mounted in equipment racks that meet ANSI/EIA 310-D and ETS 300-119 standards.

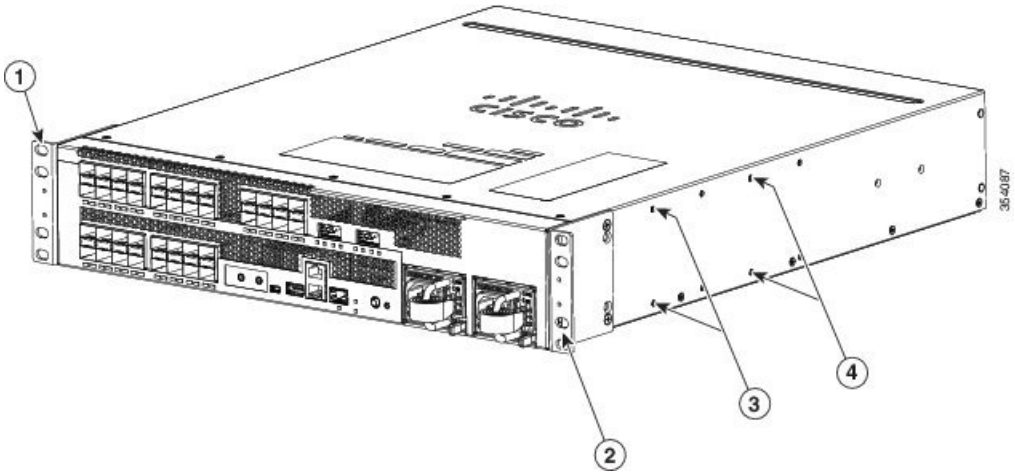
Procedure

Step 1 Before rack-mounting the chassis, determine if you need to move the L brackets so that the chassis is installed in one of the recommended positions:

- Positioned so the front of the chassis is approximately flush with the front of the rack:
  - The chassis is shipped with the L brackets in the correct location; there is no need to move them.
- Positioned so approximately one fourth of the chassis protrudes in front of the rack:
  - Remove the screws in the L brackets.
  - Reposition the L brackets to align with the first set of holes behind the holes where the L brackets were originally installed (see figure below).
  - Secure the brackets with the screws.

- Positioned so approximately one half of the chassis protrudes in front of the rack:
  - Remove the screws in the L brackets.
  - Reposition the L brackets to align with the second set of holes behind the holes where the L brackets were originally installed (see figure below).
  - Secure the brackets with the screws.

Figure 19: Locations of Screw Holes for Alternate Chassis Installation Positions



1	Left L bracket already attached. When the chassis is installed, the front of the chassis is approximately flush with the front of the rack.	3	Screw holes for reattaching the L brackets. When the chassis is installed, approximately one quarter of it protrudes in front of the rack.
2	Right L bracket already attached. When the chassis is installed, the front of the chassis is approximately flush with the front of the rack.	4	Screw holes for reattaching the L brackets. When the chassis is installed, approximately one half of it protrudes in front of the rack.

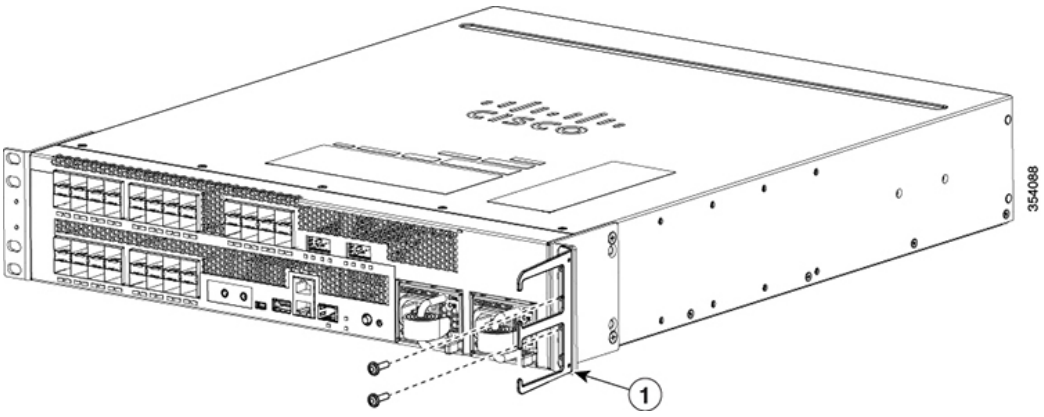
Step 2 Rest the back end of the chassis on the rack-mount shelf and carefully slide the chassis into the rack until the L brackets meet the front rails of the rack system.

Step 3 Locate the rack post holes that align with the chassis L bracket holes. If the rack post holes are prethreaded, determine if the threads are 10-32 or 12-24. If the rack post holes are unthreaded, install eight or ten (four or five on each side) either 10-32 or 12-24 clip or cage nuts over the rack post holes to accept the installation screws.

Note Clip nuts or cage nuts are not included as part of the accessory kit that comes with the chassis. You must obtain them yourself.

Step 4 If you want to install one or both of the optional cable guide assemblies, position the cable guides so that the cable guide mounting holes are aligned with L bracket holes as shown in figure below.

Figure 20: Installing the Cable Mount Guides

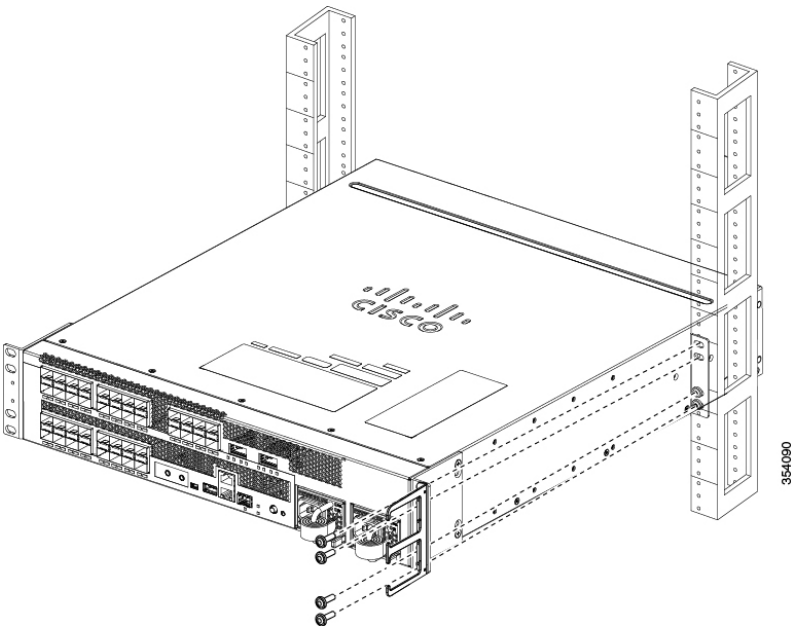


1	Cable guide

Step 5 Install all four M4.0x20mmL screws (two on each side) through the cable guide mounting holes, into the L bracket holes. Tighten the screws securely.

Step 6 Secure the chassis using four screws through the holes in the L bracket and into the rack post holes.

Figure 21: Installing the Cable Mount Guides



1	10-32 or 12-24 screws

What to do next

After installing the chassis in its location, complete the installation process by following these procedures:

- Connecting the chassis to system ground. See Establishing the System Ground, on page 45.
- Installing and connecting the power supplies to source power. For information on how to install and cable power supplies, see the Installing Power Supplies, on page 55.
- Connecting to the switch console port. See Connecting the Switch Console Port, on page 47.
- Connecting to the uplink ports. Installing SFP and SFP+ Transceiver Modules, on page 48
- Powering-up the chassis and verifying the installation. See Verifying Switch Chassis Installation, on page 50.

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 8-24 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 8-24 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—A two-hole standard barrel lug. Supports up to 8-24 AWG wire. Supplied as part of accessory kit.
- Grounding screws—Two M4 x 8 mm (metric) 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. Depending on the power supply and system, a 12 AWG to 6 AWG copper conductor is required for U.S. installations. 8-24 AWG wire is recommended. 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.

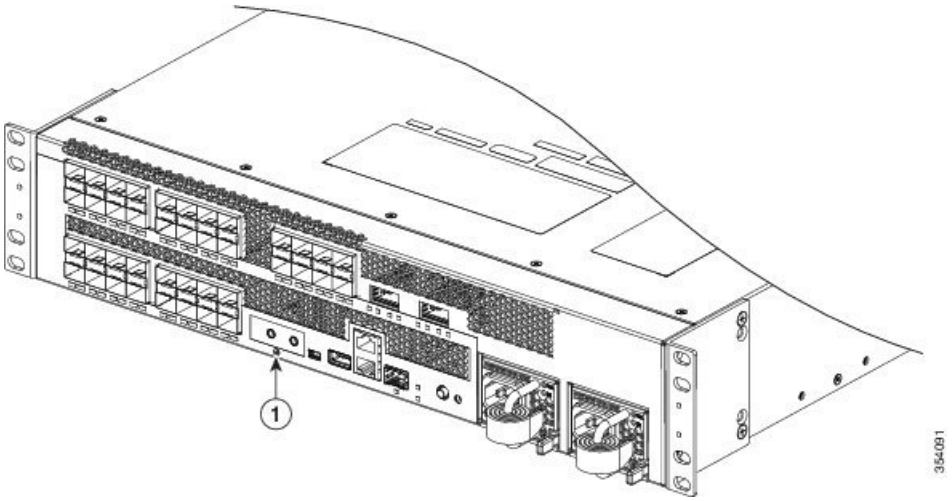
Connecting the System Ground

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

Before you begin

Review the following illustration and table.

Figure 22: System Ground Location



1	Location of system ground lug

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, making sure that there is solid metal-to-metal contact.

Step 5 Secure the grounding lug to the chassis with two M4 screws. Ensure that the grounding lug and the grounding wire will not interfere with other switch hardware or rack equipment.

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 Power Supplies in the Switch Chassis

The chassis power supplies (AC or DC) might be shipped separately from the switch chassis. Remove the power supply from its shipping packaging, and then install and connect it to the site power by referring to Installing Power Supplies, on page 55.

Note AC-input and DC-input power supplies can be mixed in a chassis.

Connecting the Switch Console Port

This section describes how to connect to the supervisor engine console port from a terminal or modem. The console port on the supervisor engine allows you to perform the following functions:

- Configure the switch from the CLI.
- Monitor network statistics and errors.
- Configure SNMP agent parameters.
- Download software updates to the switch, or distribute software images residing in flash memory to attached devices.

The console port is located on the front panel of the chassis.

The accessory kit that shipped with your switch might contain the necessary cable and adapters (depending on if you ordered them) to connect a terminal or modem to the console port. To connect a terminal to the console port using the cable and adapters provided, follow these steps:

Procedure

Step 1 Connect to the port using the RJ-45-to-RJ-45 cable and RJ-45-to-DB-25 DTE adapter or RJ-45-to-DB-9 DTE adapter (labeled "Terminal").

Step 2 Position the cable in the cable guide (if installed). Make sure there are no sharp bends in the cable.

Step 3 Check the terminal documentation to determine the baud rate. The baud rate of the terminal must match the default baud rate (9600 baud) of the console port. Set up the terminal as follows:

- 9600 baud
- 8 data bits
- No parity

- 1 stop bits

Connecting the Uplink Ports

SFP and SFP+ Transceiver Modules

The SFP and SFP+ transceiver modules provide copper or fiber-optic connections to other devices. These transceiver modules are field-replaceable and provide the uplink interfaces when installed in an SFP module slot. The SFP modules have LC connectors for fiber-optic connections or RJ-45 connectors for copper connections.

For Cisco SFP and SFP+ transceiver modules documentation, including compatibility matrixes, refer to this URL: http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html

Installing SFP and SFP+ Transceiver Modules

Before you begin

For cable specifications, see Appendix B, "Connector and Cable Specifications."

Observe these precautions:

Warning Class 1 laser product. Statement 1008

- Do not remove the dust plugs from the SFP transceiver modules or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the module ports and cables from contamination and ambient light.
- Removing and installing an SFP transceiver module can shorten its useful life. Do not remove and insert any SFP transceiver 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.

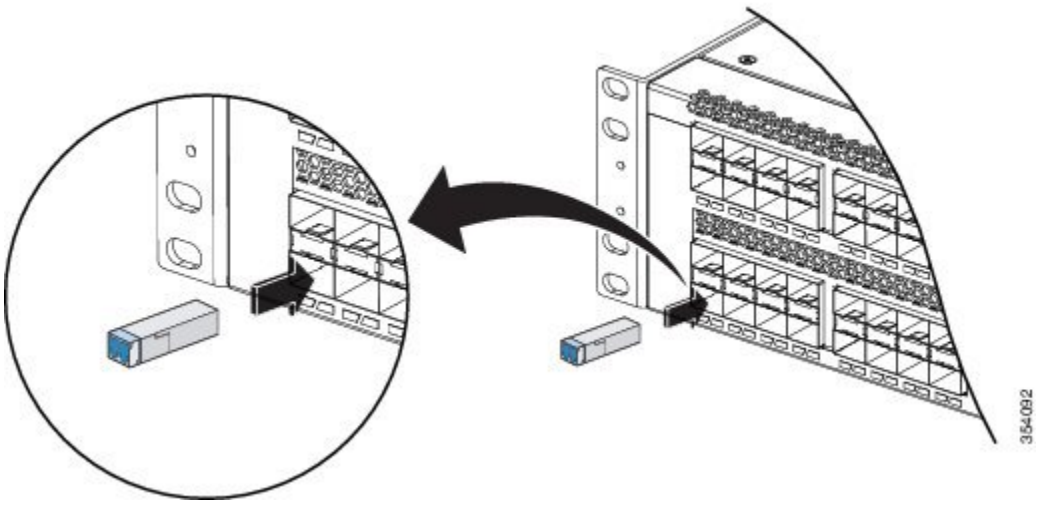
Step 2 Find the send (Tx) and receive (Rx) markings that identify the top of the SFP module.

On some SFP transceiver modules, the send and receive (Tx and Rx) markings might be shown by arrows that show the direction of the connection.

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

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

Figure 23: Installing an SFP Module in the SFP Transceiver Module Port



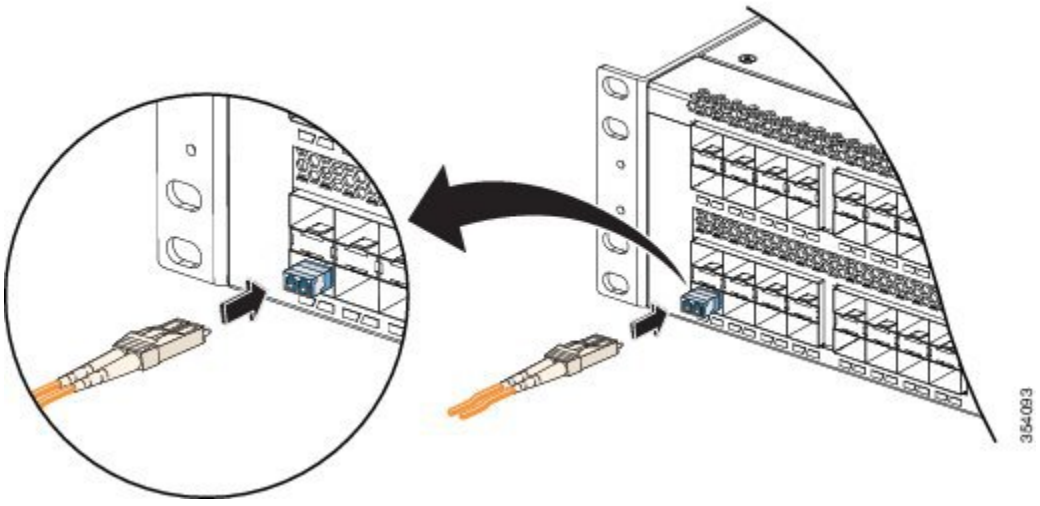
Step 5 If the module has a bale-clasp latch, close it to lock the SFP transceiver module in place.

Note If you are inserting the SFP transceiver module in the lower ports, you need to invert the module.

Step 6 Remove the SFP dust plugs and save.

Step 7 Connect the SFP cables.

Figure 24: Port with SFP Transceiver Modules Installed



Removing SFP or SFP+ Transceiver Modules

Procedure

Step 1 Attach an ESD-preventive wrist strap to your wrist and to an earth ground surface.

Step 2 Disconnect the cable from the SFP transceiver module. For reattachment, note which cable connector plug is send (Tx) and which is receive (Rx).

Step 3 Insert a dust plug into the optical ports of the SFP transceiver module to keep the optical interfaces clean.

Step 4 If the module has a bale-clasp latch, pull the bale out and down to eject the module. If you cannot use your finger to open the latch, use a small, flat-blade screwdriver or other long, narrow instrument to open it.

Step 5 Grasp the SFP transceiver module, and carefully remove it from the slot.

Step 6 Place the SFP transceiver module in an antistatic bag or other protective environment.

Verifying Switch Chassis Installation

Procedure

Step 1 Ensure that the unused power supply unit has a metal cover plate installed.

Step 2 Turn on the system. During the power-up sequence, the system performs a series of bootup diagnostic tests.

Additional system diagnostic tests are available. These tests allow you to perform a complete sanity check on the system prior to inserting the system into your network and to monitor the health of the system while the system is running. Refer to the “Online Diagnostics” section on page 3-19 for further information.

Tip When prestaging systems in a nonproduction environment, we recommend that you run all diagnostic tests, including the disruptive tests, to prescreen the systems for any failures.

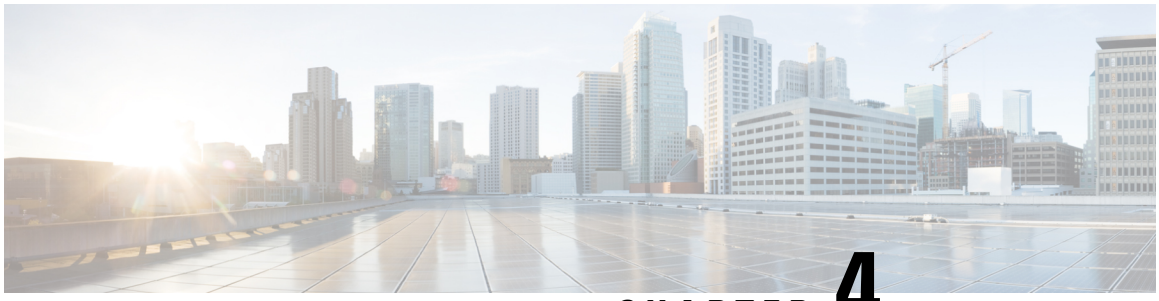
Online Diagnostics

The switch running Cisco IOS has many levels of online diagnostic capabilities. The online diagnostics are divided into four categories:

- Bootup—Bootup diagnostics automatically run during bootup, module OIR, or switchover to a backup supervisor engine.
- Background health—Monitoring diagnostic tests are continuously run by the system to monitor system health.
- On-demand online diagnostics—On-demand online diagnostics can be used to run any test from the CLI. You can also run on-demand online diagnostics to perform a sanity check on the system hardware. Some of these tests are disruptive and will impact traffic flow.You must follow the on-demand diagnostic guidelines exactly to avoid false failures.

- Scheduled diagnostics—Scheduled diagnostics can be used to run any of the above tests at user-designated intervals.

For complete information on the online diagnostic tests and how to run them, refer to the software configuration guide.



CHAPTER 4

Installing and Removing Power Supplies

Power Supply Overview

You can install two types of power supplies in the chassis:

Figure 25: Cisco Catalyst 6840-X AC Input Power Supply

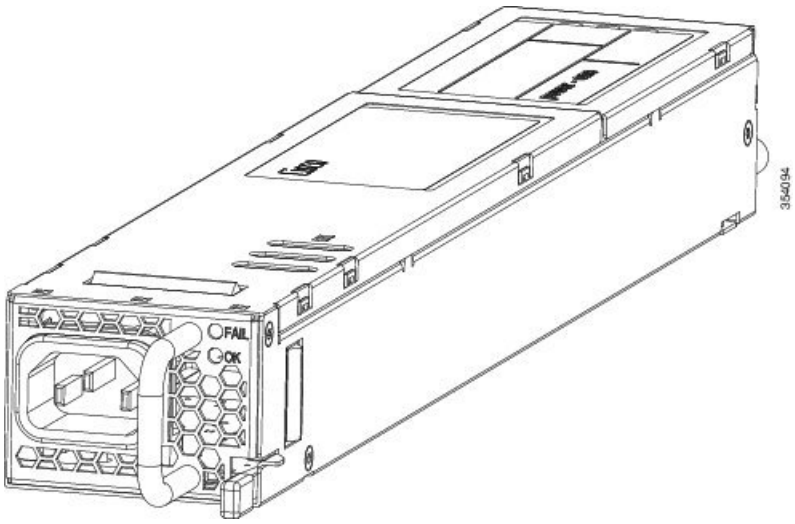
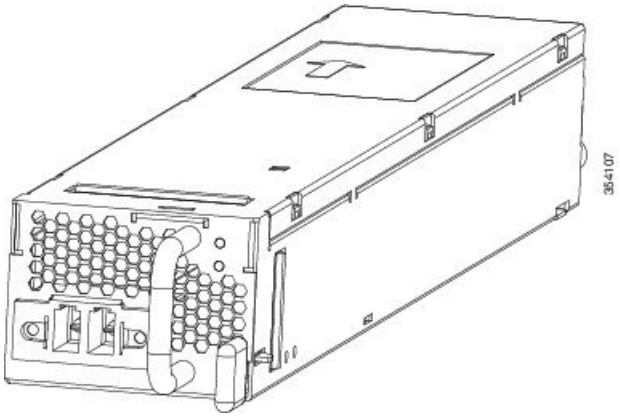


Figure 26: Cisco Catalyst 6840-X DC Input Power Supply



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

- Two AC-input power supplies
- Two DC-input power supplies
- One AC-input power supply and one DC-input power supply
- One AC-input power supply (leaving the blank cover on the other slot)
- 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 is installed in that slot to maintain the designed airflow.

This table lists the power supply models.

Part Number	Description
C6840-X-750W-AC=	Cisco Catalyst 6840-X power supply AC-750W
C6840-X-750W-DC=	Cisco Catalyst 6840-X power supply DC-750W
C6840-X-1100W-AC=	Cisco Catalyst 6840-X power supply AC-1100W
C6840-X-1100W-DC=	Cisco Catalyst 6840-X power supply DC-1100W

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 for production.

Installing Power Supplies

You follow the same steps to install the AC-input and DC-input power supplies, but you must ground them differently.

Before You Begin

- 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).
  - For the DC-input power supply, you need four power cables sized to reach the DC power source or power interface unit (PIU).
  - Grounding wire — Size this wire to meet local and national installation requirements. For U.S. installations, you must use a 8-24 AWG copper conductor. 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.

Inserting the Power Supply

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

Procedure

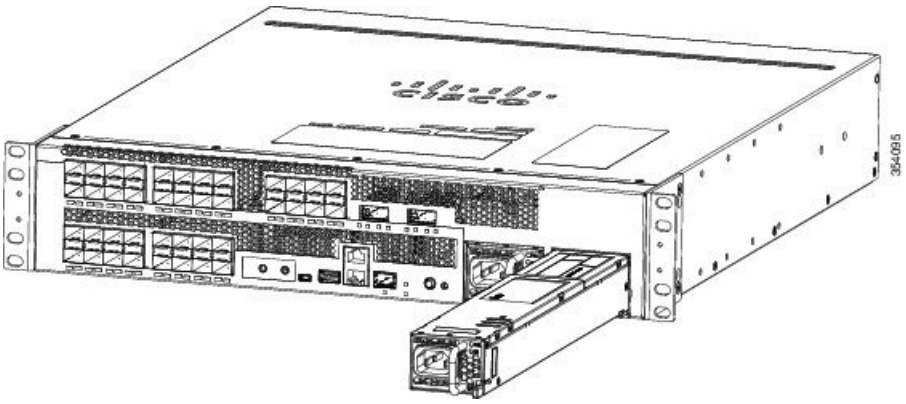
Step 1 Remove the blank cover and store it for future use.

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 handand 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.

Figure 27: Installing the Power Supply



1	AC power supply

Connecting to the Power Source

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.

Before You Begin

Before you connect power supplies to power sources, ensure the following:

- The chassis is connected to an earth ground. See Establishing the System Ground, on page 45.
- 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 8-24 AWG power cables to connect to the power supply. The 8-24 AWG 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—10 A with 110 V 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

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 Plug the power cable into the power supply.

Step 2 Plug the other end of the power cable into an power source supplied by the data center.

Note When using redundant mode, connect each power supply to a separate power source.

Step 3 Verify that the power supply is receiving power and outputting DC power by checking that the OK LED is on and is not yellow or blinking green. For an explanation of all 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 LEDs by checking that each LED turns on for a couple of seconds. If the OK LED is flashing green, check the AC power connections on the power supply and the AC power source.

Connecting to a DC Power Source

Before you connect DC power supplies to power sources, you need to attach the DC connection wires to the DC power connector. To wire the connector:

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 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 power supplies are off.

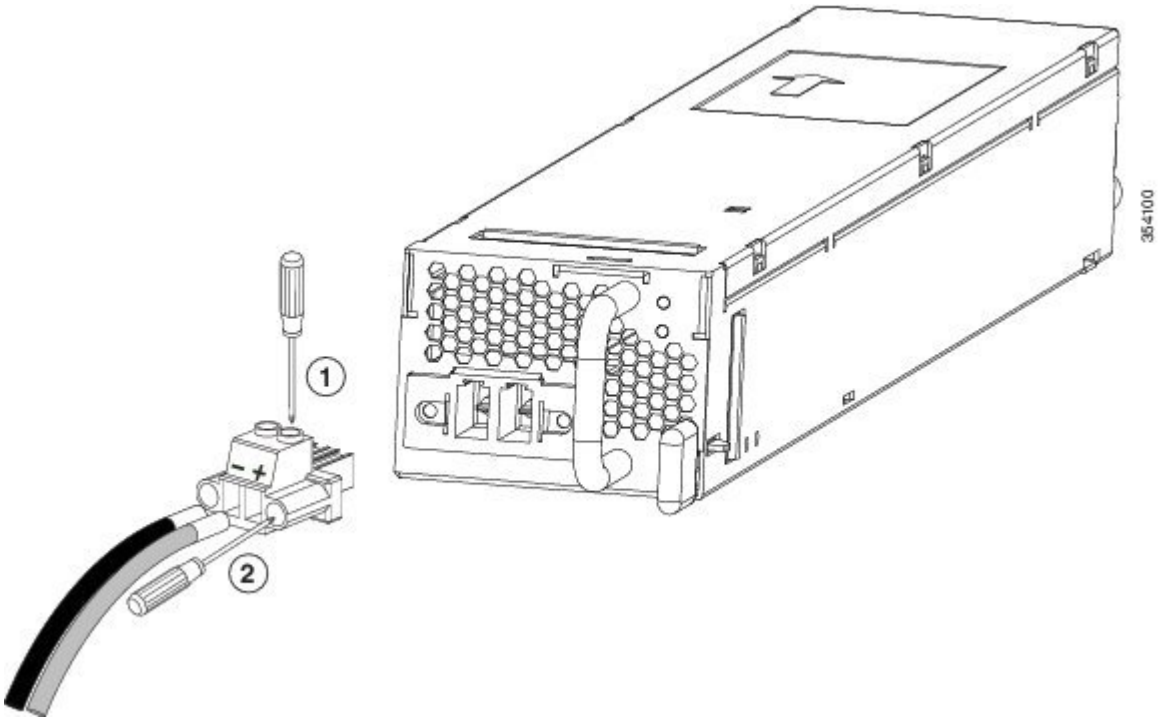
Step 2 Using a 1/8" flat head screwdriver or No. 1 Phillips head screwdriver, loosen the set screws on the connector to freely accept the power wires. The connector will accept 8-24 AWG wires, use what your local electrical code calls for.

Step 3 Strip 1/2" of insulation off the DC wires that you are using.

Step 4 Insert the black (DC negative) wire into the right aperture on the connector and tighten down the connection set screw. Finger tight or about 3 ft./lbs should be sufficient.

Step 5 Insert the red (DC positive) wire into the left aperture on the connector and tighten down the connection set screw. Do not tighten over 0.7 Nm.

Figure 28: Connecting to a DC Power Source



Step 6 For the powered down circuits connected to the power supplies, turn on the power at the circuit breaker. The LEDs should flash and then the INPUT OK LED on the power supply should turn on.

Removing Power Supplies

Procedure

Step 1 Turn off the power to the power supply that you are removing, as follows:

a) 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 source.

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

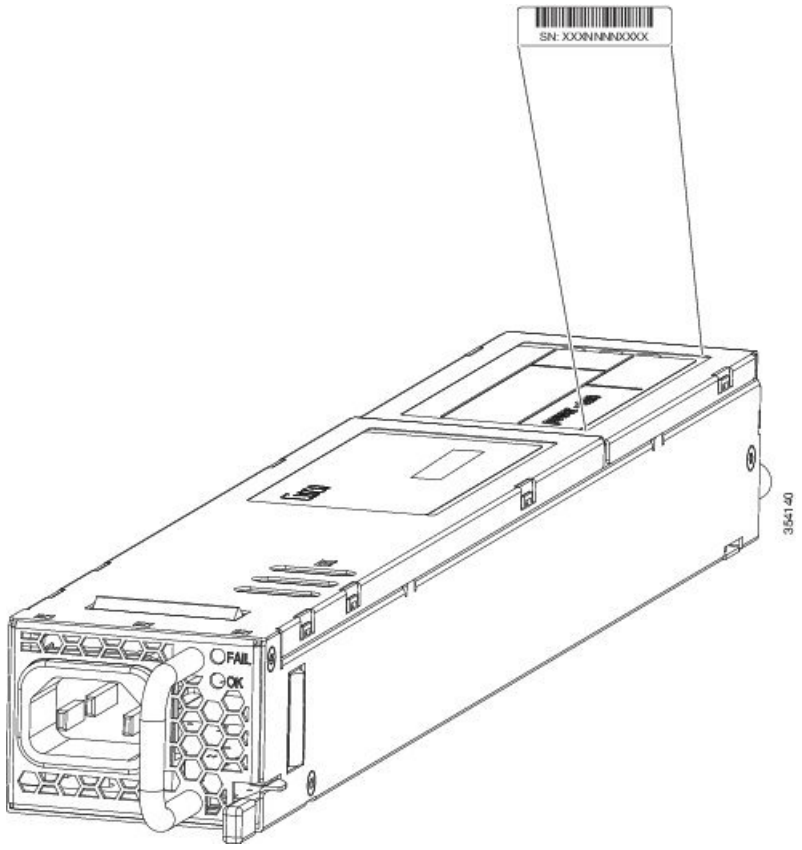
a) Press the ejector latch on the right of the power supply.
b) Pull the power supply partially out of the slot by its handle.
c) Pull the power supply fully from the slot.

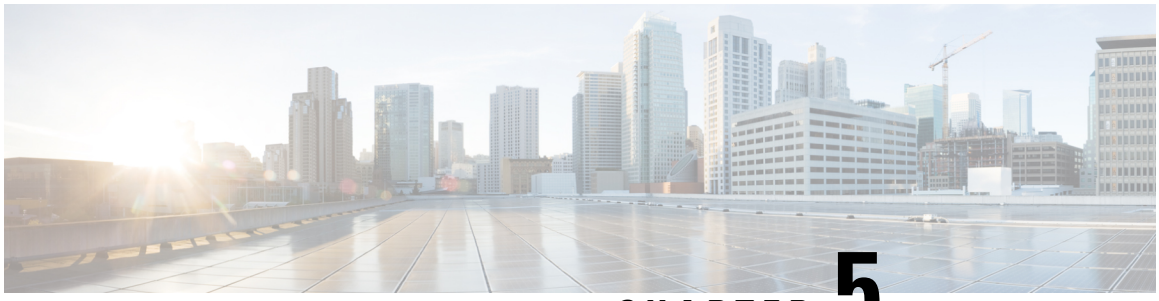
Caution If you intend to operate the switch without installing another power supply in the empty slot, then you must reinstall the blank cover over the empty power supply slot to ensure proper air flow in the system and for safety reasons.

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 version** privileged EXEC command to see the serial number.

Figure 29: Serial Number on the AC Power Supply





CHAPTER 5

Replacing the Fan Tray

Required Tools

You might need a flat-blade or number 2 Phillips-head screwdriver to loosen or tighten the captive installation screws on the fan tray.

Removing the Fan Tray

The fan tray is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

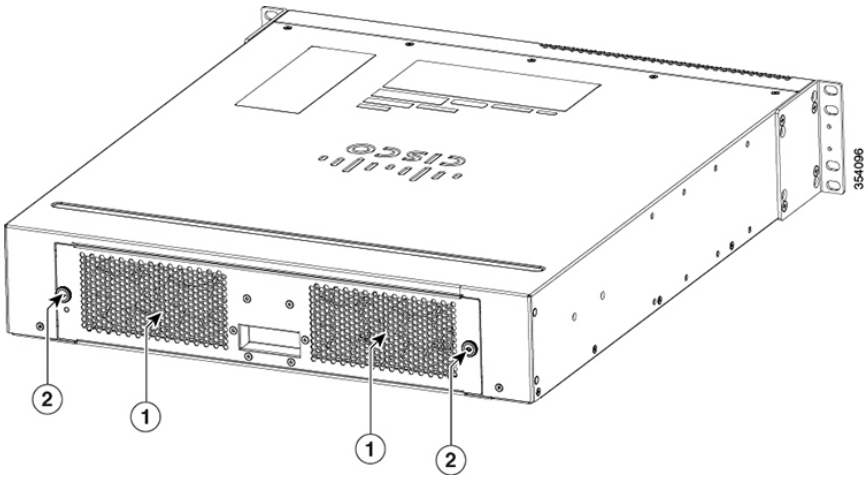
Note You have 120 seconds to remove and insert of the fan-tray, under specified ambient operating temperatures.

Warning The fans might still be turning when you remove the fan from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan's housing. **Statement 263**

Procedure

Step 1 Locate the fan tray as shown in the figure.

Figure 30: Fan Tray Location



1	Location of fan tray

Step 2 Loosen the fan tray captive installation screw by turning it counterclockwise.

Step 3 Grasp the fan tray, and pull it outward; gently move side to side, if necessary, to unseat the fan tray power connector from the backplane.

Caution When removing the fan tray, keep your hands and fingers away from the spinning fan blades. Let the fan blades stop completely before you remove the fan tray.

Step 4 Pull the fan tray clear of the chassis, and set it aside.

Installing the Fan Tray

Procedure

Step 1 Position the fan tray with the captive installation screws in front of the fan tray cavity at the rear of the chassis.

Step 2 Place the fan tray into the chassis cavity so that the pin on the fan tray assembly is aligned with the hole on the chassis. .

Step 3 Push the fan tray into the chassis until the power connector seats in the backplane and the captive installation screw make contact with the chassis.

Step 4 Tighten the captive installation screws.

Related Topics

Cooling with the Fan Tray , on page 23

Checking the Installation

Procedure

Step 1 Listen for the fans; you should immediately hear them operating. If you do not hear them, ensure that the fan tray is inserted completely in the chassis and that the faceplate is flush with the switch back panel.

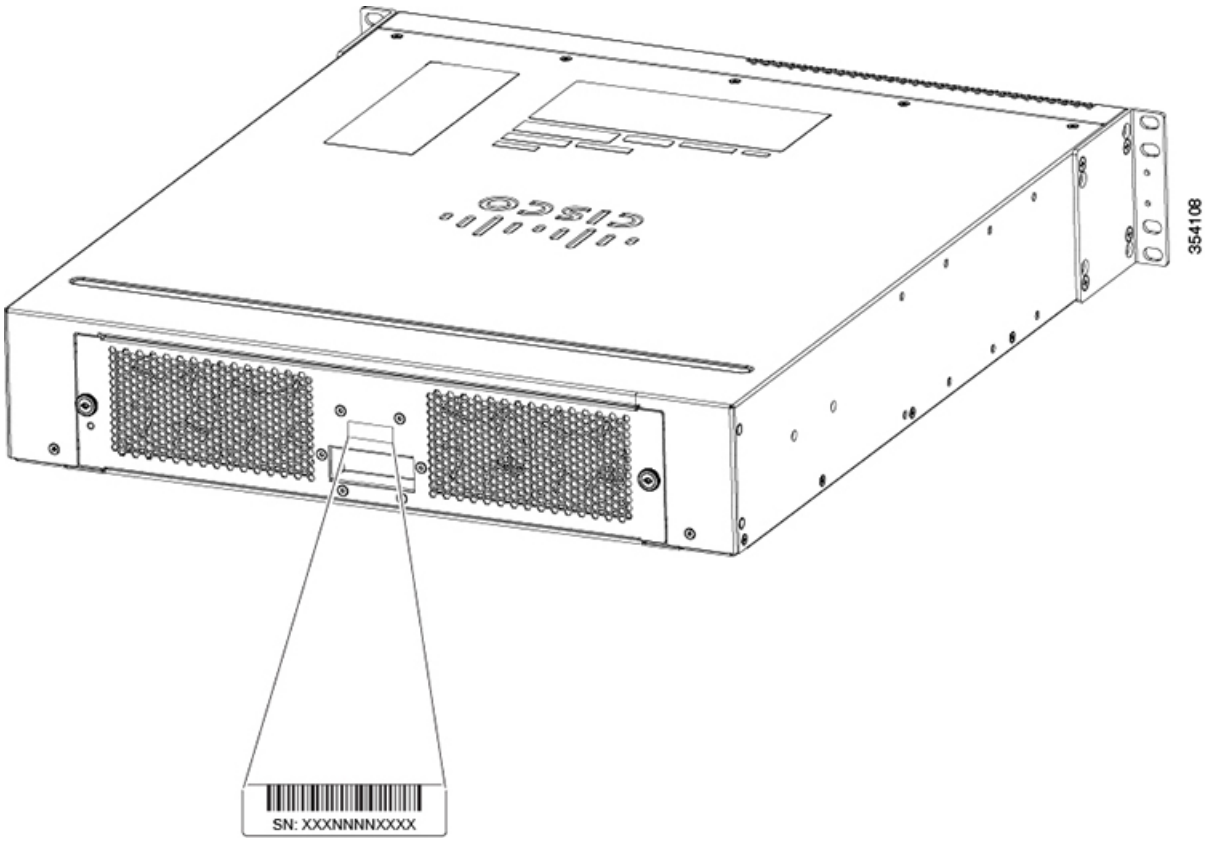
Step 2 Verify that the Fan LED is green. If the LED is amber, one or more of the fans are faulty.

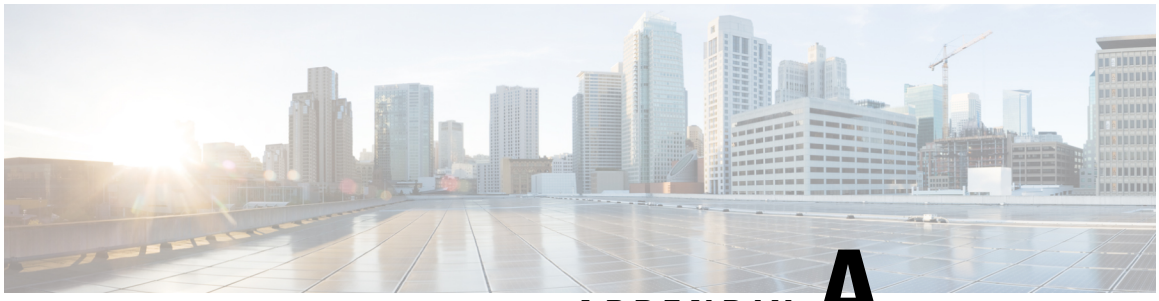
If after several attempts the fans do not operate or if you experience trouble with the installation (for instance, if the captive installation screws do not align with the chassis holes), contact a Cisco customer service representative for assistance.

Finding the Fan Serial Number

If you contact Cisco Technical Assistance, you need to know the fan serial number. This figure shows where the serial number is located. You can also use the **show version** privileged EXEC command to see the serial number. For more information, refer to Fan Tray LED

Figure 31: Serial Number on the Fan





APPENDIX A

Technical Specifications

Switch Specifications

Environmental	Specification			
	C6816-X-LE	C6832-X-LE	C6824-X-LE-40G	C6840-X-LE-40G
Temperature, operating	32°F to 104°F (0 to 40°C)	32°F to 104°F (0 to 40°C)	32°F to 104°F (0 to 40°C)	32°F to 104°F (0 to 40°C)
Temperature, nonoperating and storage	-4 to 149°F (-20 to 65°C)	-4 to 149°F (-20 to 65°C)	-4 to 149°F (-20 to 65°C)	-4 to 149°F (-20 to 65°C)
Thermal transition	0.5°C per minute (hot to cold) 0.33°C per minute (cold to hot)	0.5°C per minute (hot to cold) 0.33°C per minute (cold to hot)	0.5°C per minute (hot to cold) 0.33°C per minute (cold to hot)	0.5°C per minute (hot to cold) 0.33°C per minute (cold to hot)
Humidity (RH), ambient (noncondensing operating)	5% to 90%			
Humidity (RH), ambient (noncondensing nonoperating and storage)	5% to 95%			

Environmental	Specification			
	C6816-X-LE	**C6832-X-LE**	**C6824-X-LE-40G**	**C6840-X-LE-40G**
Altitude, operating	Certified for operation: 0 to 6500 ft (0 to 2000 m) Designed and tested for operation: -200 to 10,000 ft (-60 to 3000 m)			
Shock and vibration	Shock • Operational - 5 G 30 ms, half-sine (IEC 68-2-27) • Nonoperational - 20 G, 7.5 ms, trapezoidal Vibration • Operational - 3 Hz to 500 Hz • Power Spectral Density (PSD) - 0.0005 G2/Hz at 10 Hz and 200 Hz. 5 dB/octave roll off at each end. 0.5 hours per axis (1.12 Grams).			
Acoustic noise	Sound power level, 67 dB@27°C			
Physical characteristics				
Dimensions	• Height = 3.47 inches (8.81 cm) • Width = 17.35 inches (44.07 cm) • Depth = 21.8 inches (55.38 cm) • Rack Units (RU) = 2 RU			
Weight Chassis with 2 power supplies and a built-in fan	24.04 lbs/10.09 kgs	33.95 lbs/15.4 kgs	34.83 lbs/15.8 kgs	37.03 lbs/16.8 kgs
Airflow	C6840-X-FAN **Note** The airflow in the Catalyst 6840-X switch chassis is from front to back. See Site Requirements, on page 21 for recommended separations between walls and the chassis air intake and air exhaust and between the air exhaust of one chassis with the air intake of another chassis. Failure to maintain adequate air space can cause the chassis to overheat and the system to fail.			

Power Supply Module Specifications

	C6840-X-750W-AC=	C6840-X-750W-DC=	C6840-X-1100W-AC=	C6840-X-1100W-DC=
Physical specifications	12.5"x2.15'x1.57'			
Input voltage range	90Vac to 264Vac	-40Vdc to -72Vdc	90Vac to 264Vac	-40Vdc to -72Vdc
Input frequency range	50/60Hz	N/A	50/60Hz	N/A
Input current (each input)	less than 10A	max 25A @40V or greater	max 13A @100Vac max 7A @200Vac	max 32A @40V or greater
Rush-in current	35A cold turn-on 50A hot turn-on	90A	35A cold turn-on 50A hot turn-on	90A
Power supply input receptacles	IEC 60320	PC 5/ 2-STF-7,62	IEC 60320	PC 5/ 2-STF-7,62
Power cord rating	15A (US), 10A (international)		15A (US), 10A (international)	
British thermal units (BTUs)	2559 BTU/hour	2559 BTU/hour	3753 BTU/hour	3753 BTU/hour
Output holdup time	16 milliseconds at 100% load	4msec at 100% load	16 milliseconds at 100% load	4msec at 100% load
Environmental conditions	Operating temperature: -5C to 55^{o}c at 1800m(6000ft)	-5C to 55C at 1800m(6000ft)	Operating temperature: -5C to 55^{o}c at 1800m(6000ft)	-5C to 55C at 1800m(6000ft)

Power Supply AC Power Cords

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

Table 14: Power Supply AC Power Cords

Power Cords	
CAB-250V-10A-AR	AC Power Cord - 250V, 10A - Argentina(2.5 meter)
CAB-9K10A-AU	Power Cord, 250VAC 10A 3112 Plug, Australia(2.5 meter)

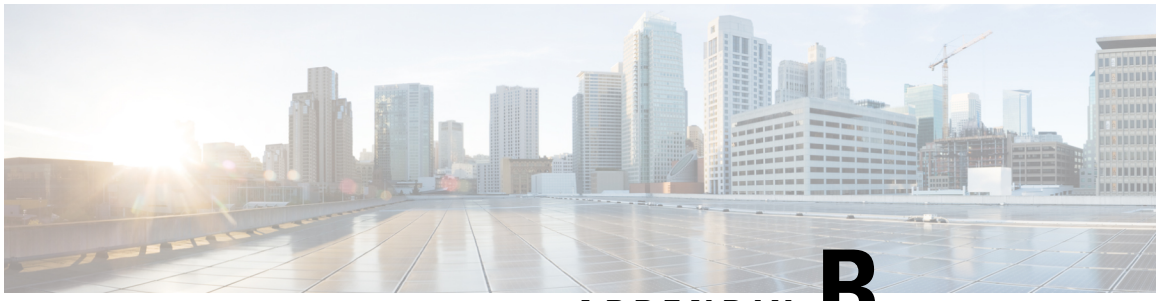
Power Cords	
CAB-250V-10A-BR	AC Power Cord - 250V, 10A - Brazil (2.1 meter)
CAB-250V-10A-CN	AC Power Cord - 250V, 10A - PRC(2.5 meter)
CAB-9K10A-EU	Power Cord, 250VAC 10A CEE 7/7 Plug, EU(2.5 meter)
CAB-IND-10A	10A Power cable for India(2.5 meter)
CAB-250V-10A-IS	AC Power Cord - 250V, 10A - Israel(2.5 meter)
CAB-9K10A-IT	Power Cord, 250VAC 10A CEI 23-16/VII Plug, Italy(2.5 meter)
CAB-250V-10A-ID	AC Power Cord - 250V, 10A, South Africa (2.5 meter)
CAB-9K10A-SW	Power Cord, 250VAC 10A MP232 Plug, SWITZ(2.5 meter)
CAB-9K10A-UK	Power Cord, 250VAC 10A BS1363 Plug (13 A fuse), UK(2.5 meter)
CAB-9K12A-NA	Power Cord, 125VAC 13A NEMA 5-15 Plug, North America(2.5 meter)
CAB-AC-250V/13A	North America, NEMA L6-20 250V/20A plug-IEC320/C13 receptacle(2.0 meter)
CAB-N5K6A-NA	Power Cord, 200/240V 6A North America(2.5 meter)
CAB-C13-CBN	Cabinet Jumper Power Cord, 250 VAC 10A, C14-C13 Connectors(0.7 meter)
CAB-C13-C14-2M	Power Cord Jumper, C13-C14 Connectors, 2 Meter Length(2 meter)
CAB-C13-C14-AC	Power cord, C13 to C14 (recessed receptacle), 10A(3 meter)

Fan Tray Module Specifications

Physical Specification	
Dimensions (H x D x W)	3.0" (H)X 12.7"(W) X1.774"(D)
Weight	1.08 Kg
Operating Specification	
Airflow	120 CFM

Chassis and Module Power and Heat Values

Module Type	Module Current (A)	Module Power (Watts)	AC-Input Power (Watts)	AC Heat Diss (BTU/HR)	DC Input Power (Watts)	DC Heat Diss (BTU/HR)
FAN	9 A	108 W	132 W	450BTU/HR	132 W	450BTU/HR
Catalyst 6816-X-LE	35 A	420 W	750 W	2559BTU/HR	750 W	2559BTU/HR
Catalyst 6832-X-LE	52 A	620 W	750 W	2559BTU/HR	750 W	2559BTU/HR
Catalyst 6824-X-LE-40G	52 A	620 W	750 W	2559BTU/HR	750 W	2559BTU/HR
Catalyst 6840-X-LE-40G	75 A	900 W	1100 W	3753BTU/HR	1100 W	3753BTU/HR



APPENDIX B

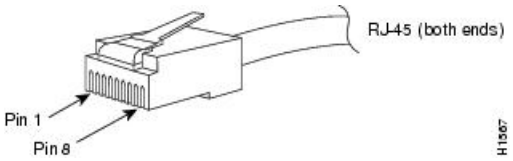
Module Connectors and Cable Specifications

Module Connectors

RJ-45 Connector

The RJ-45 connector is used to connect a Category 3, Category 5, Category 5e, or Category 6 foil twisted-pair or unshielded twisted-pair cable from the external network to the module interface connector.

Figure 32: RJ-45 Interface Cable Connector



Caution Category 5e, Category 6, and Category 6a cables can store large levels of static electricity because of the dielectric properties of the materials used in their construction. Always ground the cables (especially in new cable runs) to a suitable and safe earth ground before connecting them to the module.

Caution To comply with GR-1089 intrabuilding and lightning immunity requirements, you must use a foil twisted-pair (FTP) cable that is properly grounded at both ends.

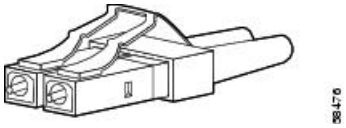
LC Connector

The LC fiber optic connector is a small form-factor fiber-optic connector that provides high-density fiber connectivity. The LC connector can be used with either MMF cable or SMF cable. The LC connector uses a latching clip mechanism that is similar to the one used on the RJ-45 copper connector.

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

Note Make sure that the optical connectors are clean before making the connections. Contaminated connectors can damage the fiber and cause data errors.

Figure 33: LC Fiber-Optic Connector



Cables and Adapters

SFP Module 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 wave-length 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 34: Four Twisted-Pair Straight-Through Cable Schematic

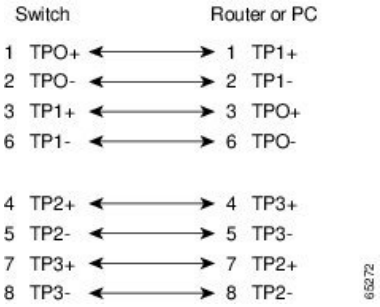


Figure 35: Four Twisted-Pair Semi-Cross Cable Schematic

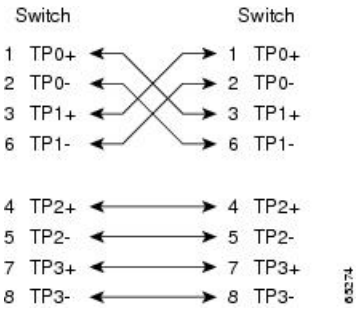


Figure 36: Two Twisted-Pair Straight-Through Cable Schematic

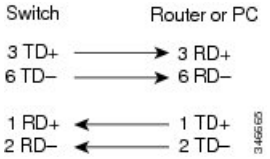
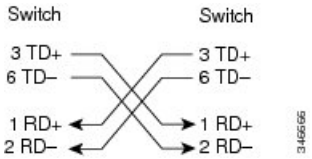


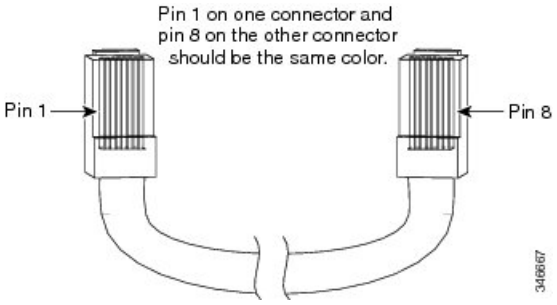
Figure 37: Two Twisted-Pair Crossover Cable Schematic



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 38: 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 15: Console Port Signaling with a DB-9 Adapter

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

Table 16: Console Port Signaling with a DB-25 Adapter

Switch Console Port (DTE)	RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	**DB-25 Pin**	**Signal**
RTS	5	CTS
DTR	6	DSR
TxD	3	RxD
GND	7	GND
GND	7	GND
RxD	2	TxD
DSR	20	DTR
CTS	4	RTS

Cleaning the Fiber-Optic Connectors

Fiber-optic connectors are used to connect two fibers together. When these connectors are used in a communications system, proper connection becomes a critical factor.

Fiber-optic cable connectors can be damaged by improper cleaning and connection procedures. Dirty or damaged fiber-optic connectors can result in communication that is not repeatable or is inaccurate.

Fiber-optic connectors differ from electrical or microwave connectors. In a fiber-optic system, light is transmitted through an extremely small fiber core. Because fiber cores are often 62.5 microns or less in

diameter, and dust particles range from a tenth of a micron to several microns in diameter, dust and any contamination at the end of the fiber core can degrade the performance of the connector interface where the two cores meet. The connector must be precisely aligned, and the connector interface must be absolutely free of trapped foreign material.

Connector loss or insertion loss is a critical performance characteristic of a fiber-optic connector. Return loss is also an important factor. Return loss specifies the amount of reflected light; the lower the reflection, the better the connection. The best physical-contact connectors have return losses greater than -40 dB, although -20 to -30 dB is more common.

The connection quality depends on two factors: the type of connector and the proper cleaning and connection techniques. Dirty fiber connectors are a common source of light loss. Keep the connectors clean at all times, and keep the dust covers installed when the connectors are not in use.

Before installing any type of cable or connector, use a lint-free alcohol pad from a cleaning kit to clean the ferrule, the protective white tube around the fiber, and the end-face surface of the fiber.

As a general rule, whenever there is a significant, unexplained loss of light, clean the connectors.

Guidelines

Connectors that are used inside the system are cleaned by the manufacturer and connected to the adapters in a proper manner. The operation of the system will be error free if the customer provides clean connectors on the application side and follows these guidelines:

- Does not clean the inside of the connector adapters.
- Does not use force or quick movements when connecting the fiber-optic connectors in the adapters.
- Covers the connectors and adapters to keep the inside of the adapters or the surface of the connectors from getting dirty when not using the connectors or while cleaning the chassis.

How to Clean the Fiber-Optic Connectors

Caution Use extreme care when removing or installing connectors so that you do not damage the connector housing or scratch the end-face surface of the fiber. Always install protective covers on unused or disconnected components to prevent contamination. Always clean fiber connectors before installing them.

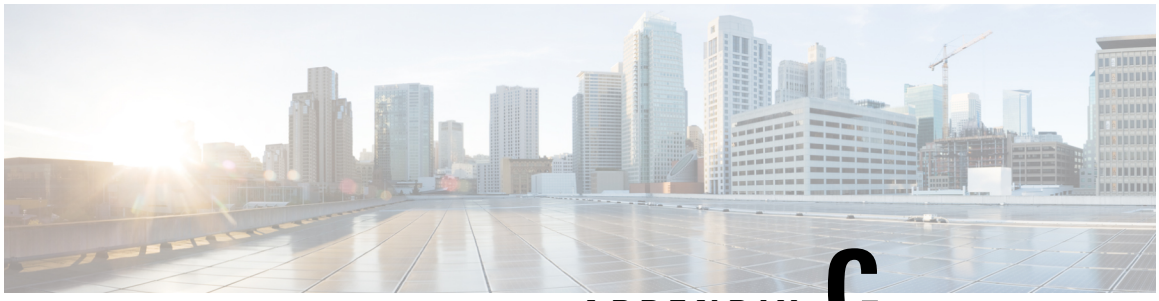
Warning Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. **Statement 1051**

Procedure

Step 1 Use a lint-free tissue soaked in 99 percent pure isopropyl alcohol to gently wipe the faceplate. Wait five seconds for the surfaces to dry, and repeat.

Step 2 Remove any residual dust from the faceplate with clean, dry, oil-free compressed air.

Step 3 Use a magnifying glass or inspection microscope to inspect the ferrule at an angle. Do not look directly into the aperture. Repeat the process if any contamination is detected.



APPENDIX C

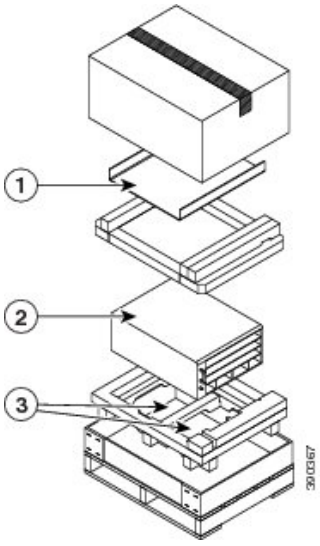
Repacking the Switch

If you need to return or move the switch chassis, follow these steps to repack the switch using the original packaging material.

Procedure

Step 1 Set the chassis in the bottom pallet.

Figure 39: Packing Material



Step 2 Place the packing bag over the chassis.

Step 3 Place the front-packing material and power supply packing material around the chassis.

Step 4 Place the power supplies in the spaces provided in the power supply packing material.

Step 5 Place the top-packing material over the top of the chassis and power supplies.

Step 6 Place the rack-mount kit and the accessory kit on the top-packing material.

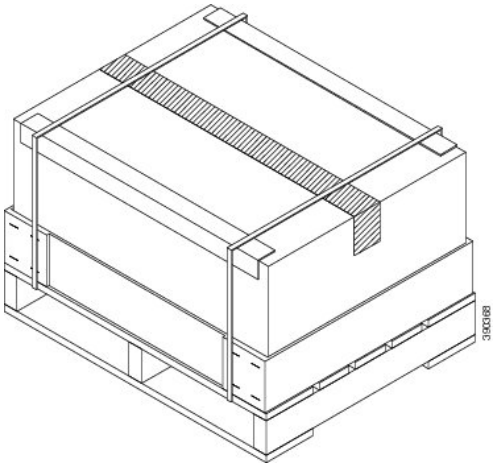
Note You must include the accessory kit for the final packaging to fit properly.

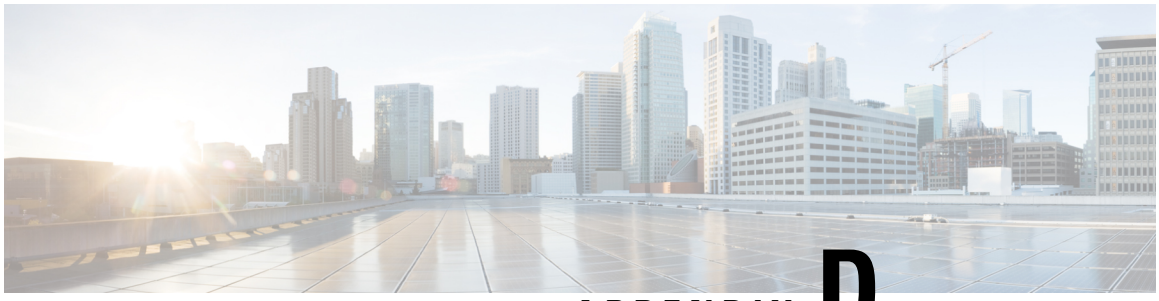
Step 7 Place the outside carton over the entire package.

Step 8 Fold the outside carton down over the top and seal with packing tape.

Step 9 Wrap three packing straps tightly around the top and bottom of the package to hold the outside carton and the bottom pallet together.

Figure 40: Final Package





APPENDIX D

Troubleshooting

Problems with the initial startup are often caused by a switching module that has become dislodged from the backplane or a power supply that has been disconnected from the power cord connector. Although temperature conditions above the maximum acceptable level rarely occur at initial startup, you might encounter these conditions during extended operation. Long-term monitoring functions also include independent reporting of DC-output voltage problems.

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 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.

- If you determine that the power supplies are functioning normally and that the fan tray assembly is faulty, contact a customer service representative.

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 OK 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 OK LED on the power supply is green.

- If the OK LED is green, the AC or DC source is good and the power supply is functional.
- If the OK 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 OK LED is green, the problem is the first power source.
- If the OK 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 OK 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 OK 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 82.

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 Contacting Cisco Customer Service, on page 82 to determine whether or not the power subsystem is functioning properly.

Step 2 Check to determine if the FAN LED is amber. If the FAN LED is amber, the fan tray is not seated in the backplane or has malfunctioned.

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 amber, the system detects an individual fan failure. Contact a customer service representative for instructions.

Status LED Indicators

Status LED Indication	Alarm Type	Component	Action
Red	Major	Chassis temperature sensor exceeds major threshold.	Syslog message and SNMP trap generated. If redundancy is configured, the system switches to the redundant supervisor engine and the active supervisor engine shuts down. If there is no redundancy and the overtemperature condition is not corrected, the system shuts down after 5 minutes.
Orange	Minor	Chassis temperature sensor exceeds minor threshold.	Syslog message and SNMP trap generated. Monitor the condition.
Red Orange	Major Minor	Redundant supervisor engine temperature sensor exceeds major or minor threshold.	Syslog message and SNMP trap generated. If major alarm and the overtemperature condition is not corrected, the system shuts down after 5 minutes. If minor alarm, monitor the condition.

Contacting Cisco Customer Service

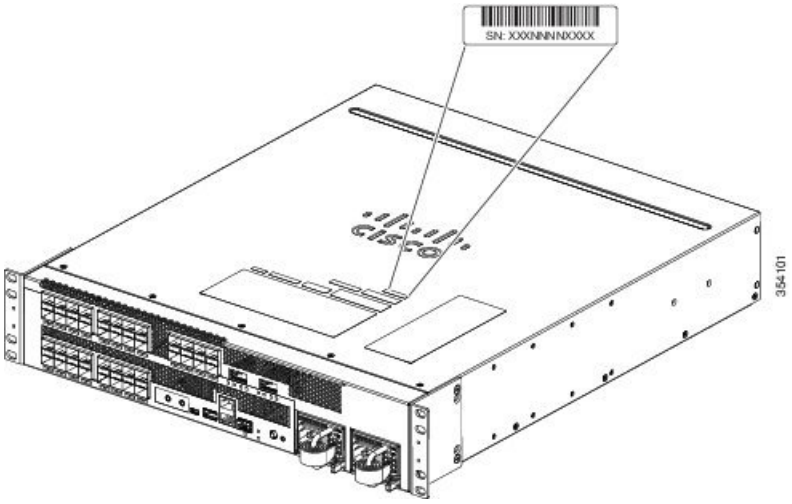
If you are unable to solve a startup problem after using the troubleshooting suggestions in this chapter, contact a Cisco customer service representative for assistance and additional instructions. Before you call, have the following information ready to help your service provider assist you as quickly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

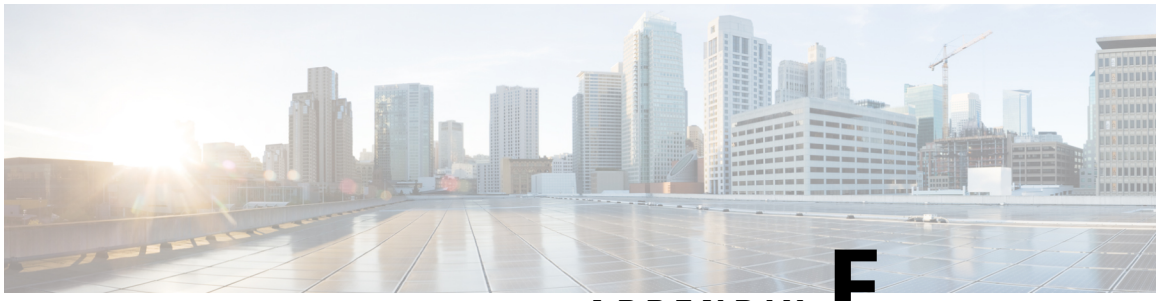
- Date on which you received the switch
- Chassis serial number
- Type of software and release number
- Maintenance agreement or warranty information
- Brief description of the problem
- Brief explanation of the steps you have already taken to isolate and resolve the problem

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 41: Serial Number on the Chassis





APPENDIX E

Installing the USB Drivers

Installing the Cisco Microsoft Windows USB Device Driver

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

Installing the Cisco Microsoft Windows XP USB Driver

Procedure

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

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

Step 2 If using 32-bit Windows XP, double-click the setup.exe file in the Windows_32 folder. If using 64-bit Windows XP, double-click the setup(x64).exe file in the Windows_64 folder.

Step 3 The Cisco Virtual Com InstallShield Wizard begins.

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

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

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

Installing the Cisco Microsoft Windows 2000 USB Driver

Procedure

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

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

Step 2 Double-click the setup.exe file.

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

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

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

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

Installing the Cisco Microsoft Windows 7 USB Driver

Procedure

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

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

Step 2 If using 32-bit Windows 7, double-click the setup.exe file in the Windows_32 folder. If using 64-bit Windows 7, double-click the setup(x64).exe file in the Windows_64 folder.

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

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

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

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

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

Uninstalling the Cisco Microsoft Windows USB Driver

Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver

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

Using the Setup.exe Program

Before you begin

Disconnect the switch console terminal before uninstalling the driver.

Procedure

Step 1 Run setup.exe for Windows 32-bit or setup(x64).exe for Windows-64bit. Click **Next.**
Step 2 The InstallShield Wizard for Cisco Virtual Com appears. Click **Next.**
Step 3 When the Program Maintenance window appears, select the Remove radio button. Click **Next.**
Step 4 When the Remove the Program window appears, click **Remove.**
Step 5 When the InstallShield Wizard Completed window appears, click **Finish.**

Using the Add or Remove Programs Utility

Before you begin

Disconnect the switch console terminal before uninstalling the driver.

Procedure

Step 1 Click **Start** > **Control Panel** > **Add or Remove Programs.**
Step 2 Scroll to Cisco Virtual Com and click **Remove.**
Step 3 When the Program Maintenance window appears, select the **Remove** radio button. Click **Next.**

Uninstalling the Cisco Microsoft Windows 7 USB Driver

Before you begin

Disconnect the switch console terminal before uninstalling the driver.

Procedure

Step 1 Run setup.exe for Windows 32-bit or setup(x64).exe for Windows-64bit. Click **Next.**
Step 2 The InstallShield Wizard for Cisco Virtual Com appears. Click **Next.**
Step 3 When the Program Maintenance window appears, select the Remove radio button. Click **Next.**
Step 4 When the Remove the Program window appears, click **Remove.**

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

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