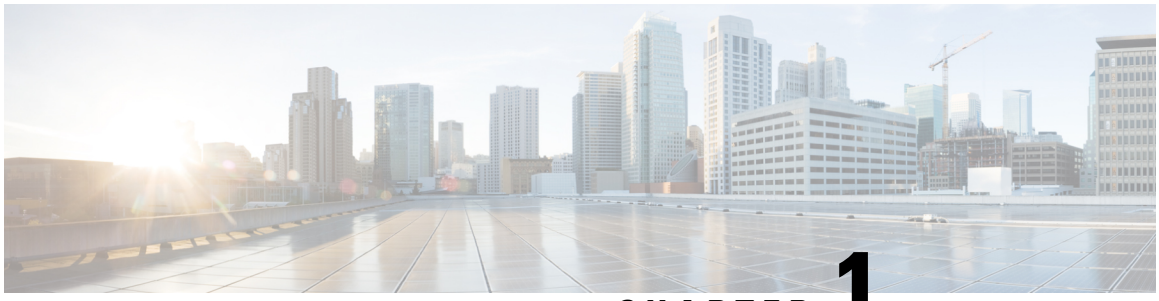
Cisco 8500 Series Secure Routers Hardware Installation Guide

First Published: 2025-09-09

Last Modified: 2025-09-09

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

CONTENTS



CHAPTER 1

Overview

The Cisco 8500 Series Secure Routers are designed as enterprise aggregation routers for data center or colocation deployments. These routers are powered by the 3rd generation Quantum Flow Processor (QFP) ASIC to accelerate routing and encryption in a compact 1RU form factor.

This document covers only hardware installation specific details for the following models of Cisco 8500 Series Secure Routers:

- C8550-G2
- C8570-G2

For more information on the features and specifications of Cisco 8500 Series Secure Routers, refer the …..

Hardware features

Table 1: Hardware Features for Cisco 8500 Series Secure Routers

Feature	C8570-G2	C8550-G2
Ethernet Ports	12x SFP+ 2x QSFP28 100/40GE 2x QSFP 40GE	12x SFP+
Rack Units	One	One
System Memory (DRAM)	32 GB default (two DIMMS) can be upgraded to 64 GB total	32 GB default (two DIMMS) can be upgraded to 64 GB total

Feature	C8570-G2	C8550-G2
Storage	480 GB SSD	480 GB SSD
Management Interface	RJ-45 console port	RJ-45 console port
Console Port	1xRJ45, 1x USB Micro-USB	1xRJ45, 1x USB Micro-USB
USB Ports	USB Type C	USB Type C
Rack Installation	Two post and four post	Two post and four post

Table 2: Supported Transceivers for Cisco 8500 Series Secure Routers

Feature	C8570-G2	C8550-G2
Supported Transceivers	12x SFP+,2x QSFP28 100/40GE, 2x QSFP 40GE 1G SFP or 10G SFP+ can be configured with dual-rate 10GE ports as follows: **10G SFP+ on dual-rate 10GE Interface:** Auto-negotiation protocol is not supported, and automatic negotiation cannot be configured using **negotiation auto** command. **1G SFP on dual-rate 10GE Interface:** Auto-negotiation protocol is supported, and automatic negotiation can be configured using **negotiation auto** command. To disable auto negotiation, use **no negotiation auto** command.	12x SFP+ 1G SFP or 10G SFP+ can be configured with dual-rate 10GE ports as follows: **10G SFP+ on dual-rate 10GE Interface:** Auto-negotiation protocol is not supported, and automatic negotiation cannot be configured using **negotiation auto** command. **1G SFP on dual-rate 10GE Interface:** Auto-negotiation protocol is supported, and automatic negotiation can be configured using **negotiation auto** command. To disable auto negotiation, use **no negotiation auto** command.

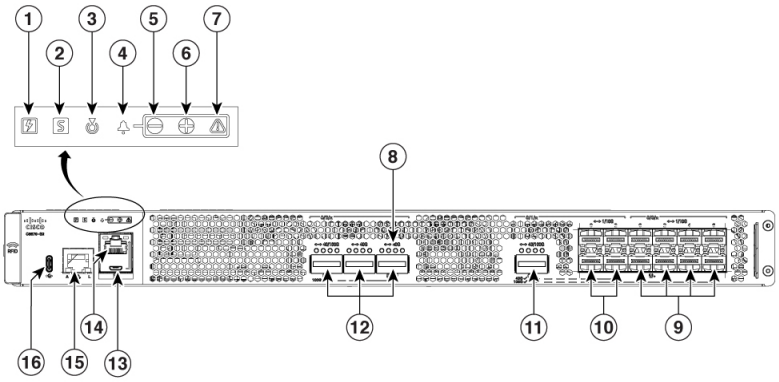
Table 3: Power Supply

Power Supplies	C8570-G2	C8550-G2
AC	PWR-CH1-750WACR	PWR-CH1-750WACR
DC	PWR-CH1-950WDCR	PWR-CH1-950WDCR

Chassis views

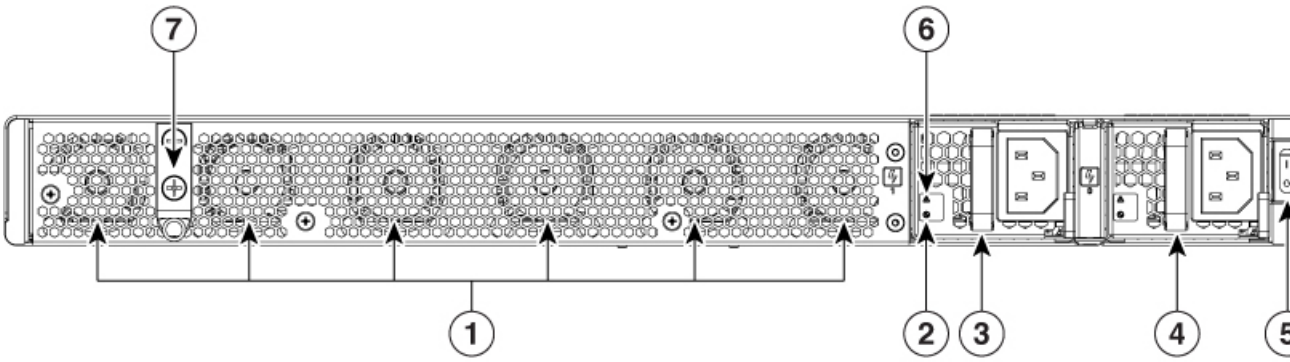
Cisco C8570-G2 chassis views

Figure 1: Cisco C8570-G2 Front View



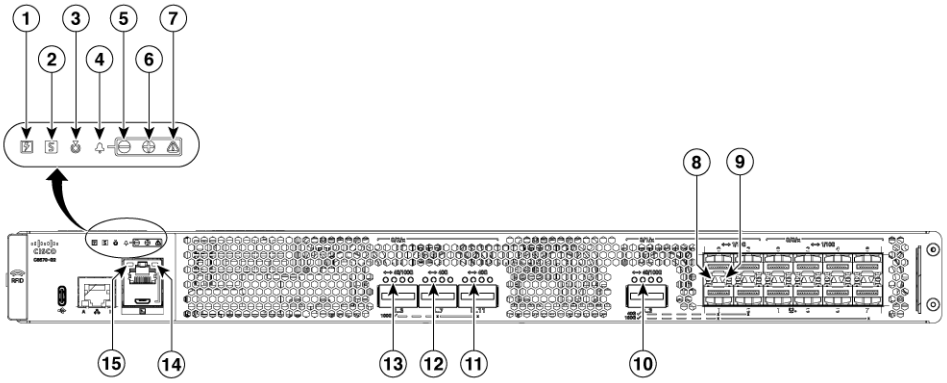
1	Power LED	11	Bay 1 : Configurable 100G or 40G
2	Status LED	12	Bay 2 : Configurable 1x100G or 3x40G
3	Beacon LED	13	Micro USB Console Port
4	Main Alarm LED	14	RJ 45 Console Port
5, 6 and 7	Minor, Major, Critical Alarm LEDs	15	Management Port (RJ 45)
8	Link Status LED	16	USB-C
9	Bay 0 : 8x 1/10 GE		
10	Bay 1 : 4x1/10 GE		

Figure 2: Cisco C8570-G2 Rear View



1	Fans	5	Power switch
2	Power supply AC input LED	6	Power supply failure LED
3, and 4	PEM 0, PEM 1	7	Ground Lug Attachment

Figure 3: Cisco C8570-G2 Router LEDs

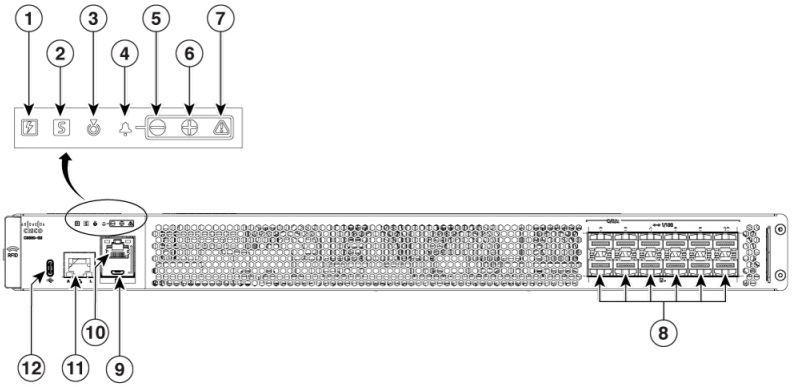


1	Power LED Off : No power to chassis. Yellow : Power On, one power supply has failed or is not plugged in. Green : All power is within specifications	8,9	Top and Bottom Port LED
2	Status LED Off : System not booted Red : System Failure Yellow : System booted to Rommon Green : System Booted to IOS	10	Bottom Port LED

3	Beacon LED	11, 12 and 13	Link Status LED
4	Alarm LED - Main	14	USB Console Active LED Left LED On indicates that USB console is acti
5, 6 and 7,	Alarm LED – Minor, Major and Critical	15	Console RJ-45 Active LED Right LED On indicates that RJ-45 console is active

Cisco C8550-G2 chassis views

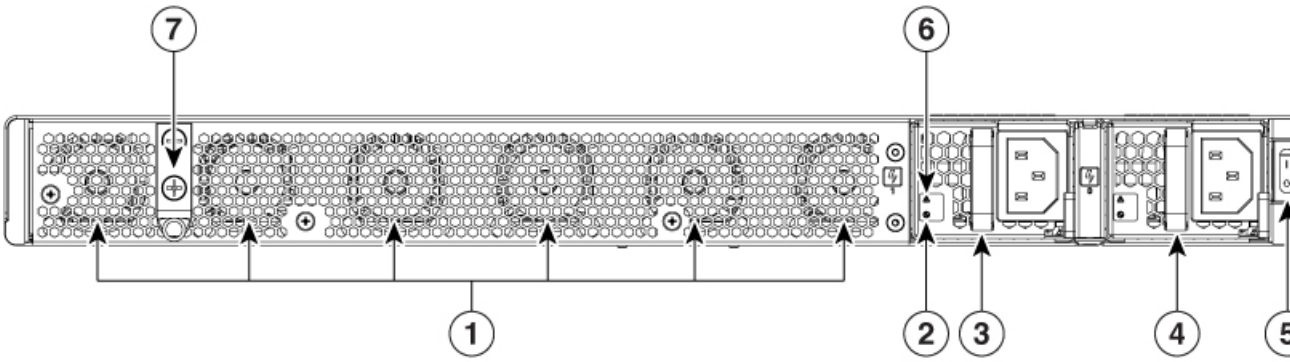
Figure 4: Cisco C8550-G2 Front View



1	Power LED	8	Bay 0 : 12x 1/10GE SFP+ ports
2	Status LED	9	Micro USB Control Port
3	Beacon LED	10	RJ 45 Console Port
4	Alarm LEDs - Main	11	Management Port RJ 45
5, 6 and 7	Minor, Major, Critical Alarm LEDs	12	USB-C Micro-USB Console

The following figure shows the rear view of C8550-G2

Figure 5: Cisco C8550-G2 Rear View



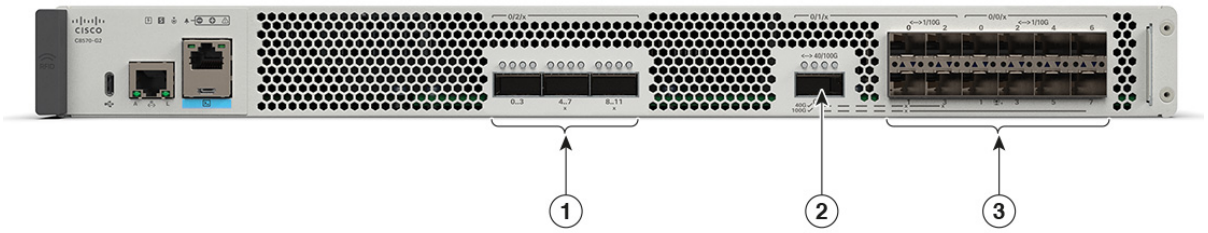
1	Fans	5	Power Switch
2	Power supply AC input LED	6	Power supply failure LED
3, and 4	PEM 0, PEM 1	7	Ground Lug Attachment

Bay configuration

Bay configuration - C8570-G2

The C8570-G2 has three bays that are configurable.

Figure 6: Bay Configuration - C8570-G2



1	Bay 2 : 3XQSFP : Individually configurable as 1x 100G or 3x 40G	3	Bay 1 : 4xSFP+/1xQSFP : Individually configurable as 1x 100G or 1x 40G or breakout 4x 10/1G
2	Bay 0 : 8xSFP+ : Individually configurable as 8x 10/1G		—

Bay configuration - C8550-G2

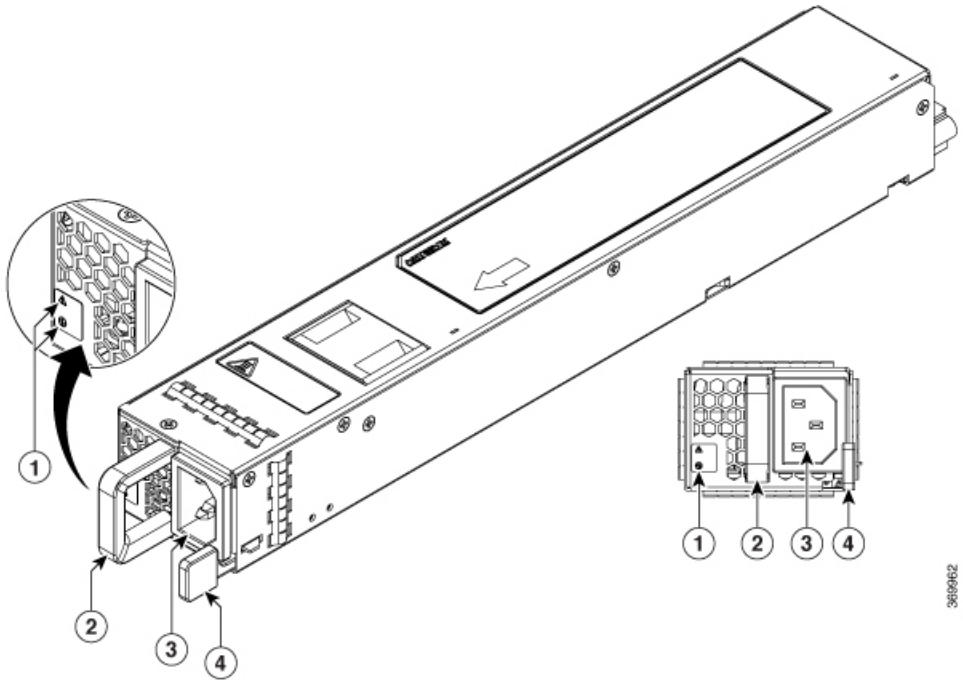
The C8550-G2 has one bay with twelve configurable ports.

Figure 7: Bay Configuration - C8550-G2

1	Bay 0 : 12XSFP+: Individually configurable as 12X10G/1G

AC power supply

Figure 8: AC Power Supply Used in the Cisco C8570-G2 Router



1	Fail and OK LEDs	3	AC power connector
2	Handle	4	Retaining latch

DC power supply

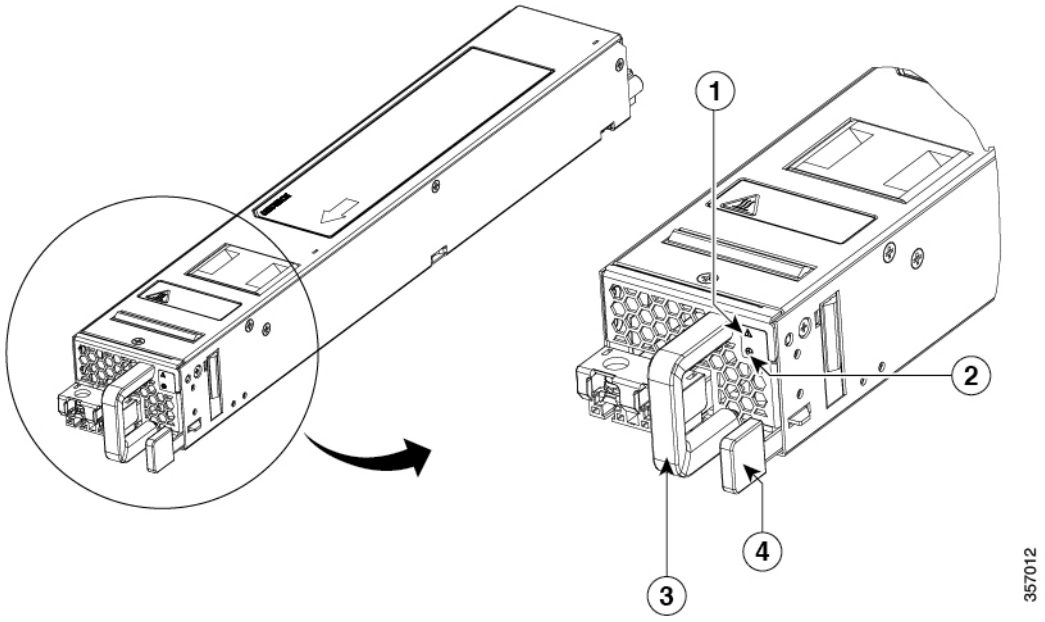
The DC (PWR-CH1-950WDCR) input connector is a two-wire connector with connection polarity from left to right (when facing the unit) of positive (+) and negative (–).

The power supply has a handle to be used for insertion and extraction. The module must be supported with one hand because of its length.

Note The airflow direction is front to back with ambient air drawn in from the venting located on the chassis front sides.

The following figure shows the DC power supply.

Figure 9: DC Power Supply



1	Fail LED	2	OK LED
3	Handle	4	Retaining latch

Power supply LED

The following table describes the power supply LED.

Table 4: AC and DC Power Supply LED

Power Supply Condition	Green (OK) LED Status	Amber (FAIL) LED Status
No power to all power supplies	Off	Off
Power Supply Failure (includes over voltage, over current, over temperature and fan failure)	Off	On
Power Supply Warning events where the power supply continues to operate (high temperature, high power and slow fan)	Off	1Hz (blinking once per second)
AC Present/3.3VSB on (PSU Off)	1Hz (blinking once per second)	Off
Power Supply On and OK	On	Off

Power supply fans

The fans in the power supply module are used for cooling the power supply module itself while system-level cooling is provided by fans within the chassis. The power supplies do not depend on the system-level fans for cooling. Fan failure is determined by fan-rotation sensors.

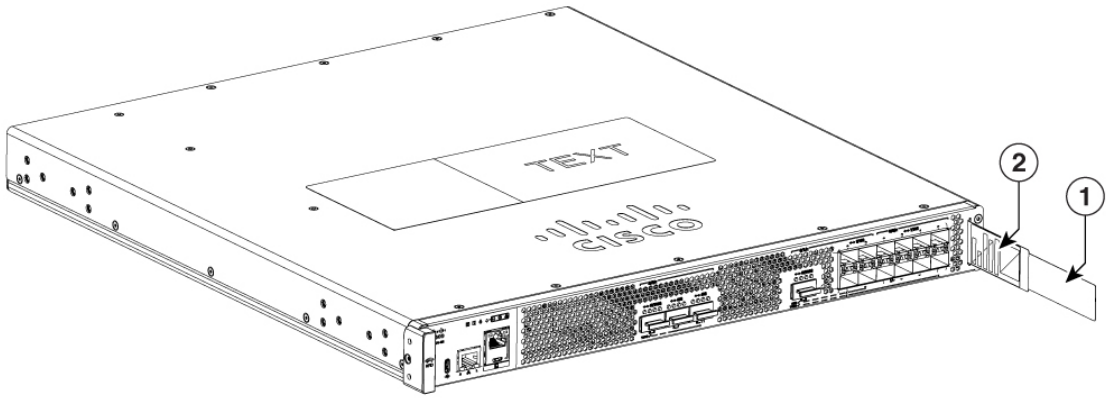
Caution The chassis has a front-to-rear airflow. All of the power supplies and fan modules in the same chassis must use the same airflow direction or an error will occur with possible overheating and shut down of the router. If you power up the router with more than one airflow direction, you must power down the router and replace the modules with the wrong airflow direction before powering up the router.

Note The fans in the power supply modules will run as soon as the power supply is plugged in, even if the power switch is in the Standby position.

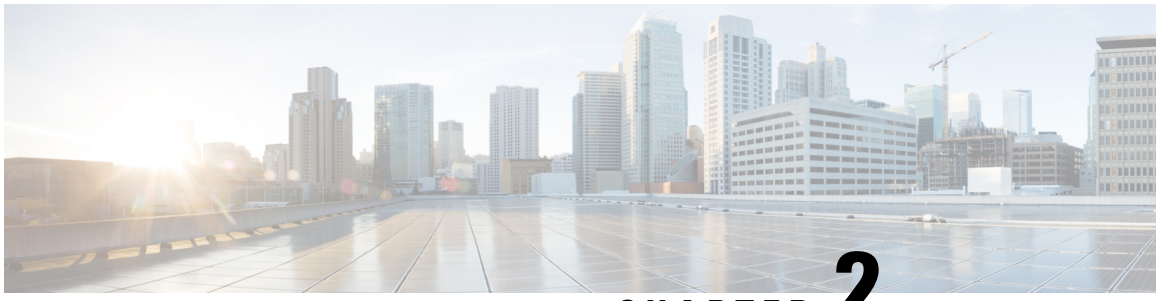
Serial number and PID/VID label location

The following figure show the location of the serial number and the PID/VID label on the Cisco 8500 Series Secure Routers .

Figure 10: Cisco C8570-G2 and C8550-G2 Serial Number and PID/VID Label Location



1	Label Carrier, extended from chassis	2	PID/VID Label



CHAPTER 2

Preparing your site for installation

This chapter contains important safety information you should know before working with the Cisco 8500 Series Secure Routers and guides you through the process of preparing your site for router installation.

Prerequisites and preparation

Before you perform the procedures in this guide, we recommend that you:

- Read the safety guidelines in the next section and review the electrical safety and ESD-prevention guidelines in this guide.
- Ensure that you have all of the necessary tools and equipment (see the "Tools and Equipment" section).
- Ensure that you have access to the *Cisco 8500 Series Secure Router Software Configuration Guide* (an online document that is available for viewing or download at Cisco.com) during the installation.
- Ensure that the power and cabling requirements are in place at your installation site.
- Ensure that the equipment required to install the router is available.
- Ensure that your installation site meets the environmental conditions to maintain normal operation.

Before installing the router, you must consider power and cabling requirements that must be in place at your installation site, special equipment for installing the router, and the environmental conditions your installation site must meet to maintain normal operation.

The shipping package for the router is engineered to reduce the chances of product damage associated with routine material handling experienced during shipment:

- Router should always be transported or stored in its shipping package in the upright position.

- Keep the router in the shipping container until you have determined the installation site.

Note Inspect all items for shipping damage. If an item appears damaged, contact a Cisco customer service representative immediately.

Site planning checklist

Use the following checklist to perform and account for all the site-planning tasks described in this chapter:

- The site air conditioning system can compensate for the heat dissipation of the router.
- Electrical service to the site complies with the requirements.
- The electrical circuit servicing the router complies with the requirements.
- Consideration has been given to console port wiring and limitations of the cabling involved, according to TIA/EIA-232F.
- The Ethernet cabling distances are within limitations.
- The equipment rack in which you plan to install the router chassis complies with requirements. Careful consideration has been given to safety, ease of maintenance, and proper airflow in selecting the location of the rack.

Safety guidelines

Before you begin the installation or replacement procedure, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.

Note This section contains guidelines, and do not include every potentially hazardous situation. When you install a router, always use common sense and caution.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement.

Before you install, configure, or perform maintenance on the router, review the documentation for the procedure you are about to perform, paying special attention to the safety warnings.

Note Do not unpack the system until you are ready to install it. Keep the chassis in the shipping container to prevent accidental damage until you determine an installation site. Use the appropriate unpacking documentation included with the system.

Read the installation instructions in this document before you connect the system to its power source. Failure to read and follow these guidelines could lead to an unsuccessful installation and possibly damage the system and components.

Safety Recommendations

The following guidelines will help to ensure your own safety and protect your Cisco equipment. This list does not cover all potentially hazardous situations, so *be alert*.

- Cisco safety policy mandates that all its routers must conform to the requirements of IEC 60950-1 and IEC 62368-1, with appropriate national deviations, as a minimum. In addition, Cisco routers must also meet the requirements of any other normative documents, for example, standards, technical specifications, laws or regulations.
- Review the safety warnings listed in *Regulatory Compliance and Safety Information for the Cisco 8500 Series Secure Routers* (available online at Cisco.com) before installing, configuring, or maintaining the router.
- Never attempt to lift an object that might be too heavy for you to lift by yourself.
- Always turn all power supplies off and unplug all power cables before opening the chassis.
- Always unplug the power cable before installing or removing a chassis.
- Keep the chassis area clear and dust free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the chassis. Fasten your tie or scarf and sleeves.
- The router operates safely when it is used in accordance with its marked electrical ratings and product-usage instructions.

Cautions and regulatory compliance statements for NEBS

The following table lists cautions, regulatory compliance statements, and requirements for the Network Equipment Building System (NEBS) certification.

Note **Statement 7001—**ESD Mitigation

This equipment may be ESD sensitive. Always use an ESD ankle or wrist strap before handling equipment. Connect the equipment end of the ESD strap to an unfinished surface of the equipment chassis or to the ESD jack on the equipment if provided.

Note **Statement 7003—**Shielded Cable Requirements for Intrabuilding Lightning Surge

The intrabuilding port(s) of the equipment or subassembly must use shielded intrabuilding cabling/wiring that is grounded at both ends. The following port(s) are considered intrabuilding ports on this equipment:

- RJ-45 Copper Ethernet Ports

Note **Statement 7004—**Special Accessories Required to Comply with GR-1089 Emission and Immunity Requirements

To comply with the emission and immunity requirements of GR-1089, shielded cables are required for the following ports:

- RJ-45 Copper Ethernet Ports

Note **Statement 7005—**Intrabuilding Lightning Surge and AC Power Fault

The intrabuilding port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring for more than 6 meters (approximately 20 feet). These interfaces are designed for use as intrabuilding interfaces only (Type 2, 4, or 4a ports as described in GR-1089) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to an OSP wiring system. The following ports are considered intrabuilding ports on the equipment:

- RJ-45 Copper Ethernet Ports

Warning **Statement 7008—**Equipment Using Agreed Primary Protection

This product is intended to be protected by a surge protector that meets the applicable criteria of GR-974-CORE or GR-1361-CORE. Failure to use this appropriate surge protector could result in susceptibility to lightning surges or create a potential hazard due to power faults.

Warning **Statement 7012—**Equipment Interfacing with AC Power Ports

Connect this equipment to AC mains that are provided with a surge protective device (SPD) at the service equipment that complies with NFPA 70, the National Electrical Code (NEC).

Note **Statement 7013—**Equipment Grounding Systems—Common Bonding Network (CBN)

This equipment is suitable for installations using the CBN.

Note **Statement 7015—**Equipment Bonding and Grounding

When you use thread-forming screws to bond equipment to its mounting metalwork, remove any paint and nonconductive coatings and clean the joining surfaces. Apply an antioxidant compound before joining the surfaces between the equipment and mounting metalwork.

Note **Statement 7016—** Battery Return Conductor

Treat the battery return conductor of this equipment as Isolated DC return (DC-I).

Note **Statement 7018—**System Recover Time

The equipment is designed to boot up in less than 30 minutes provided the neighboring devices are fully operational.

Note **Statement 8015—**Installation Location Network Telecommunications Facilities

This equipment is suitable for installation in network telecommunications facilities.

Note **Statement 8016—**Installation Location Where the National Electric Code (NEC) Applies

This equipment is suitable for installation in locations where the NEC applies.

Standard warning statements

Note The English warnings in this document are preceded by a statement number. To see the translations of a warning in other languages, look up its statement number in the *Regulatory Compliance and Safety Information for the Cisco 8500 Series Secure Routers.*.

General safety warnings

Take note of the following general safety warnings:

Warning **Statement 1071—**Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS

Warning **Statement 1040—**Product Disposal

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

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

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

Warning **Statement 1005—**Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. To reduce risk of electric shock or fire, ensure that the protective device is rated not greater than:

AC:

- 20 A U.S.

DC:

- 30 A U.S.

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

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

Warning **Statement 1017—**Restricted Area

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

Warning **Statement 1086—**Power Terminals, Replace Cover

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

Warning **Statement 1024—**Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Warning **Statement 1055—**Class 1/1M Laser

Warning – Invisible Laser Radiation. Do not expose users of telescopic optics. Class 1/1M Laser Products.

Warning **Statement 1032—**Lifting the Chassis

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

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

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they block electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Take note of the following laser safety warnings:

Warning **Statement 1051—**Laser Radiation

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

Warning **Statement 1056—**Unterminated Fiber Cable

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments, for example, eye loupes, magnifiers, and microscopes, within a distance of 100 mm, may pose an eye hazard.

Fiber Type and Core Diameter (μm)	Wavelength (nm)	Maximum Power (mW)	Beam Divergence (rad)
SM 11	1200-1400	39-50	0.1-0.11
MM 62.5	1200-1400	150	0.18 NA
MM 50	1200-1400	135	0.17 NA
SM 11	1400-1600	112-145	0.11-0.13

Warning **Statement 1255—**Laser Compliance Statement

Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.

Site planning

This section contains site-planning information, and will help you plan for the installation of the Cisco 8500 Series Secure Routers

General precautions

Observe the following general precautions when using and working with the Cisco 8500 Series Secure Routers

- Keep your system components away from radiators and heat sources and do not block cooling vents.
- Do not spill food or liquids on your system components and never operate the product in a wet environment.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Position system cables and power supply cable carefully. Route system cables and power supply cable and plug such that they cannot be stepped on or tripped over. Be sure that nothing else rests on your system component cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.
- If you turn off your system, wait at least 30 seconds before turning it on again to avoid system component damage.

Site cabling guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the Cisco 8500 Series Secure Routers , consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, EMI, and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair cabling, or unshielded twisted-pair cabling.

Also consider any additional interface equipment you need, such as transceivers, hubs, switches, modems, channel service units (CSUs), or data service units (DSUs).

Before you install the Cisco 8500 Series Secure Routers , have all the additional external equipment and cables at hand. For ordering information, contact a Cisco customer service representative.

The extent of your network and the distances between network interface connections depend in part on the following factors:

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as guidelines when planning your network connections prior to installing the Cisco 8500 Series Secure Routers .

If wires exceed 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.

USB serial console

The USB serial console port connects directly to the USB connector of a PC using a USB Type A to 5-pin mini USB Type-B cable. The USB Console supports full speed (12Mbps) operation. The console port does not support hardware flow control.

Note

- Always use shielded USB cables with a properly terminated shield. The USB serial console interface cable must not exceed 3 meters in length.
- Only one console port can be active at a time. When a cable is plugged into the USB console port, the RJ-45 port becomes inactive. Conversely, when the USB cable is removed from the USB port, the RJ-45 port becomes active.
- 4-pin micro USB Type-B connectors are easily confused with 5-pin micro USB Type-B connectors. Only 5-pin micro USB Type-B is supported.

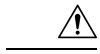
Preventing electrostatic discharge damage

Electrostatic discharge (ESD) damage occurs when electronic cards or components are improperly handled resulting in complete or intermittent failures. Static electricity can harm delicate components inside your

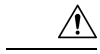
system. To prevent static damage, discharge static electricity from your body before you touch any of your system components, such as a microprocessor. As you continue to work on your system, periodically touch an unpainted metal surface on the computer chassis.

The following are guidelines for preventing ESD damage:

- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact. Before removing a card from the chassis, connect the equipment end of the strap to the ESD plug at the bottom of the chassis below the power entry modules.
- Handle line cards by faceplates and carrier edges only; avoid touching the card components or connector pins.
- When removing a module, place the removed module component-side-up on an antistatic surface or in a static-shielding bag. If the module is to be returned to the factory, immediately place it in a static-shielding bag.
- Avoid contact between the modules and clothing. The wrist strap protects the card from ESD voltages only on the body; ESD voltages on clothing can still cause damage.
- When transporting a sensitive component, place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.



Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be less than 35 megohms.



Caution Always tighten the captive installation screws on all the system components when you are installing them. These screws prevent accidental removal of the module, provide proper grounding for the system, and help ensure that the bus connectors are properly seated in the backplane.

Rack-mounting guidelines

This section describes guidelines on rack-mounting.

Precautions for rack-mounting

The following rack-mounting guidelines are provided to ensure your safety:

- Do not move large racks by yourself. Due to the height and weight of a rack, a minimum of two people are required to accomplish this task.
- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to the components in the rack.
- Do not step or stand on any component or system when servicing other systems or components in a rack.
- When mounting the Cisco 8500 Series Secure Router 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.

General rack-selection guidelines

The Cisco 8500 Series Secure Router can be mounted in most two-post or four-post, 19-in. equipment racks that comply with the Electronics Industries Association (EIA) standard for equipment racks (EIA-310-D 19-in.). The rack must have at least two posts with mounting flanges to mount the chassis.

Caution When mounting a chassis in any type of rack equipment, ensure that the inlet air to the chassis does not exceed 40°C.

The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 in. ± 0.06 in. (46.50 cm ± 0.15 cm). The rack-mounting hardware included with the chassis is suitable for most 19-in. (48.3-cm) equipment racks.

Consider installing the Cisco 8500 Series Secure Router in a rack with the following features:

- NEBS-compliant, 19-in. (48.3-cm) wide rack.
- EIA or ETSI hole patterns in the mounting rails. Required mounting hardware is shipped with the Cisco 8500 Series Secure Router. If the rack that you plan to install the system in has metric-threaded rails, you must provide your own metric-mounting hardware.
- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.

Note The Cisco 8500 Series Secure Router should *not* be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. Installing the router in any type of enclosed rack—*even with the front and back doors removed*—could disrupt the air flow, trap heat next to the chassis, and cause an overtemperature condition inside the router. If you use an enclosed rack, make certain that there are air vents on all sides of the rack and there is proper ventilation.

Equipment rack guidelines

The placement of racks can affect personnel safety, system maintenance, and the system's ability to operate within the environmental characteristics described in Cisco 8500 Series Secure Routers. Choose a proper location for the Cisco 8500 Series Secure Routers by following the guidelines below.

Locating for safety

If the Cisco 8500 Series Secure Routers is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack's center of gravity is as low as possible.

Locating for easy maintenance

Keep at least 3 feet of clear space in front of and behind the rack. This space ensures that you can remove the Cisco 8500 Series Secure Routers components and perform routine maintenance and upgrades easily.

Avoid installing the Cisco 8500 Series Secure Routers in a congested rack and consider how the routing of cables from other pieces of equipment in the same rack might affect access to the routers cards.

The front and top of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis.

Allow the following clearances for normal system maintenance:

- At the top of the chassis—At least 3 in. (7.6 cm)
- In front of the chassis—3 to 4 ft (91.44 cm to 121.92 cm)

To avoid problems during installation and ongoing operation, follow these general precautions when you plan the equipment locations and connections:

- Use the **show environment all** and the **show facility-alarm status** commands regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings for high temperature and creates reports on any occurrences. If warning messages are displayed, take immediate action to identify the cause and correct the problem.
- Keep the Cisco 8500 Series Secure Routers off the floor and out of the areas that collect dust.
- Follow ESD-prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

Locating for proper airflow

Ensure that the location of the Cisco 8500 Series Secure Routers have enough airflow to keep the system operating within the environmental characteristics, and the air temperature is sufficient to compensate for the heat dissipated by the system.

Avoid locating the Cisco 8500 Series Secure Routers in a location in which the chassis air intake vents could draw in the exhaust air from adjacent equipment. Consider how the air flows through the router. The airflow direction is front to back with ambient air drawn in from the venting located on the chassis' front sides.

Electrical safety

Follow these basic guidelines when you are working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before installing or removing a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe. Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

Chassis-Lifting guidelines

The chassis is not intended to be moved frequently. Before you install the system, ensure that your site is properly prepared so that you can avoid having to move the chassis later to accommodate power sources and network connections.

Each time you lift the chassis or any heavy object, follow these guidelines:

- Ensure that your footing is solid, and balance the weight of the chassis between your feet.
- Lift the chassis slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. If you must bend down to lift the chassis, bend at the knees, not at the waist, to reduce the strain on your back muscles.
- Do not remove installed components from the chassis.
- Always disconnect all external cables before lifting or moving the chassis.

Tools and equipment

The following tools and equipment are recommended as the minimum necessary equipment to install the Cisco 8500 Series Secure Routers. You may need additional tools and equipment to install associated equipment and cables. You may also require test equipment to check electronic and optical signal levels, power levels, and communications links.

- Phillips hand screwdriver
- 3.5-mm flat-blade screwdriver
- Tape measure (optional)
- Level (optional)
- Power drill
- 8-gauge wire
- Rack-mount brackets
- Cable-management brackets

Unpacking and verifying shipping contents

When you receive your chassis, perform the following steps and use the shipping contents checklist in the following section.

Procedure

Step 1 Inspect the box for any shipping damage. (If there is damage, contact your Cisco service representative).

Step 2 Unpack the Cisco 8500 Series Secure Routers.

Step 3 Perform a visual inspection of the chassis.

Step 4 After you have unpacked the system, verify that you have received all of the required components, including all the accessory items. Using the packing list as a guide, verify that you have received all the equipment listed in your order, and ensure that the configuration matches the packing list.

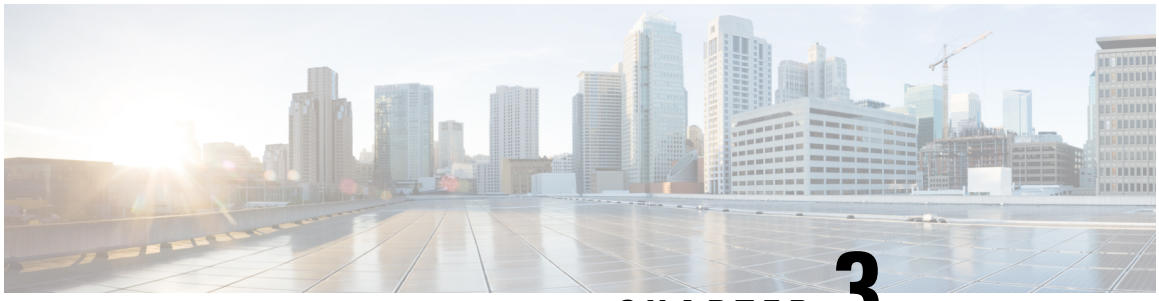
Checking the shipping container contents

Use the components list shown in the following table to check the contents of the Cisco 8500 Series Secure Routers shipping container. Do not discard the shipping container. You need the container if you move or have to ship the Cisco 8500 Series Secure Routers in the future.

Table 5: Cisco 8500 Series Secure Routers Shipping Container Contents

Component	Description
Chassis	Cisco 8500 Series Secure Routers are configured with dual AC or dual DC power supplies.
Accessories Kit (C85G2-ACCKIT-19)	Front chassis rack-mount brackets that you will attach to the chassis with their respective screws.
	Two sets of screws, one each for: • Two front rack-mount brackets (6 screws for each bracket) • Two cable-management brackets (1 mounting screw for each Cisco 8500 Series Secure Routers bracket) • Ground Lug kit with 2 screws
	1 RJ-45 to RJ-45 crossover cable
Accessories Kit (C85G2-ACCKIT-23)	Two sets of screws, one each for: • Two front rack-mount brackets (6 screws for each bracket) • Two cable-management brackets (1 mounting screw for each Cisco 8500 Series Secure Routers brackets) • Ground Lug kit with 2 screws
Accessories Kit (C85G2-4PT-KIT)	Two sets of screws, one each for: • Two front rack-mount brackets (6 screws for each bracket) • Two rear mount long snap to fit brackets (6 screws for each bracket) • Two rear rack slide rack brackets
Documentation	Pointer Doc

Component	Description
Optional Equipment	Power cord if an AC power supply was shipped. There are no power cords for the DC power supply units.



CHAPTER 3

Installing the Router

This chapter provides procedures for installing the Cisco 8500 Series Secure router on an equipment shelf, tabletop, or in an equipment rack.

Installation instructions

Warning

Statement 1071—Warning Definition

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.

SAVE THESE INSTRUCTIONS

Note

Statement 1056—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

Invisible laser radiation may be emitted from the fiber cable or connector. Do not view with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.

Note **Statement 1255—**Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.

Warning **Statement 1004—**Installation Instructions

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

Note Proceed with the installation if you have already unpacked your chassis and read all the site requirements for your new equipment.

Guidelines for installation

The chassis should already be in the area where you want to install it. If you have not determined where to install your chassis,

- Keep at least 3 feet of clear space in front of and behind the rack. This space ensures that you can remove the Cisco 8500 Series Secure Router components and perform routine maintenance and upgrades easily.

  Avoid installing the Cisco 8500 Series Secure Router in a congested rack and consider how the routing of cables from other pieces of equipment in the same rack might affect access to the routers cards.

  The front and top of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis.

  Allow the following clearances for normal system maintenance:

  - At the top of the chassis—At least 3 in. (7.6 cm)
  - In front of the chassis—3 to 4 ft (91.44 cm to 121.92 cm)

- The chassis should be installed off the floor. Dust that accumulates on the floor is drawn into the interior of the router by the cooling fans. Excessive dust inside the router can cause overtemperature conditions and component failures.
- Maintain a minimum clearance of 3 inches on the front and back sides of the chassis for the cooling air inlet and exhaust ports, respectively. Avoid placing the chassis in an overly congested rack or directly next to another equipment rack; the heated exhaust air from other equipment can enter the inlet air vents and cause an overtemperature condition inside the router.
- The chassis needs adequate ventilation. Do not install it in an enclosed cabinet where ventilation is inadequate.
- Keep the cable-management bracket ready if you plan to install it on the front of the chassis.

- Ensure that an adequate chassis ground (earth) connection exists for your router chassis (see the "Attaching a Chassis Ground Connection" section).

Installing the router on a standalone equipment shelf

Procedure

Step 1 Remove any debris and dust from the equipment shelf or platform, as well as the surrounding area.

Step 2 Lift the chassis into position on the equipment shelf.

Note
Step 3 through Step 9 are optional if you are installing the Cisco 8500 Series Secure Routers on a rack shelf. The chassis rack-mount brackets must be installed prior to installing the cable-management brackets.

Step 3 Attach the front rack-mount brackets. Locate the threaded holes in the front sides of the chassis (first holes beyond the vent holes) and use the package of black screws that shipped with the chassis.

Step 4 Align the front rack-mount bracket to one side of the chassis.

Step 5 Insert and tighten the screws on one side.

Step 6 Repeat Step 3 through Step 5 on the other side of the chassis. Use all the screws to secure the rack-mount brackets to the chassis.

Step 7 Gather the two cable-management brackets and screws shipped with your chassis.

Step 8 Screw a cable-management bracket to each side of the rack-mount brackets that are attached to the chassis. Use two screws for each cable-management bracket. Use a screw from the package of four screws.

Note
Ensure that the cable-management U feature device has the open end pointing outwards when you attach it to the chassis.

Step 9 Check that all the screws are securely tightened.

Guidelines for rack installation

The Cisco 8500 Series Secure Routers can be installed in the following rack types:

- Two-post rack, either 19 inch or 23 inch. Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). Airflow through the chassis is from front to back.
- Four-post, 19-inch equipment rack. Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). Airflow through the chassis is from front to back.

The Cisco 8500 Series Secure Routers can be installed with both front or rear rack-mount brackets.

When planning your rack installation, consider the following guidelines:

- The Cisco 8500 Series Secure Routers requires a minimum of 1.75 inches or 4.45 cm rack units of vertical rack space. The Cisco 8500 Series Secure Routers requires a minimum of 3.5 inches or 8.9 cm rack units of vertical rack space. Measure the proposed rack location before mounting the chassis in the rack.
- Before using a particular rack, check for obstructions (such as a power strip) that could impair rack-mount installation. If a power strip does impair a rack-mount installation, remove the power strip before installing the chassis, and then replace it after the chassis is installed.
- Allow sufficient clearance around the rack for maintenance. If the rack is mobile, you can push it back near a wall or cabinet for normal operation and pull it out for maintenance (installing or moving cards, connecting cables, or replacing or upgrading components). Otherwise, allow 19 inches (48.3 cm) of clearance to remove field-replaceable units.
- Maintain a minimum clearance of 3 inches on the front and back sides of the chassis for the cooling air inlet and exhaust ports, respectively. Avoid placing the chassis in an overly congested rack or directly next to another equipment rack; the heated exhaust air from other equipment can enter the inlet air vents and cause an overtemperature condition inside the router.

Caution To prevent chassis overheating, never install a Cisco 8500 Series Secure Routers in an enclosed space that is not properly ventilated or air conditioned.

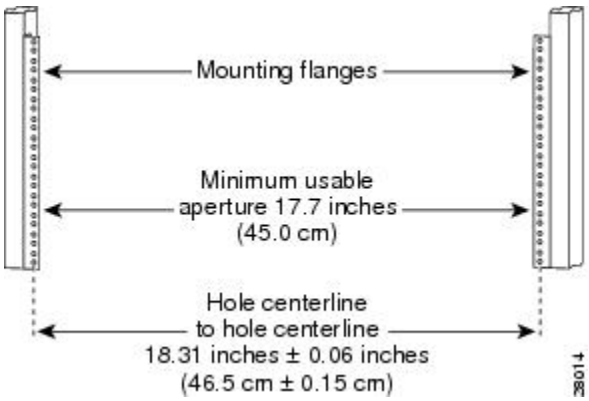
Caution The recommended torque for rack mount bracket screws is 8 in-lbs.

- Always install heavier equipment in the lower half of a rack to maintain a low center of gravity to prevent the rack from falling over.
- Install and use the cable-management brackets included with the Cisco 8500 Series Secure Routers to keep cables organized and out of the way of the cards and processors. Ensure that cables from other equipment already installed in the rack do not impair access to the cards or require you to disconnect cables unnecessarily to perform equipment maintenance or upgrades.
- Provide an adequate chassis ground (earth) connection for your router chassis.

Verifying rack dimensions

Before you install the chassis, measure the space between the vertical mounting flanges (rails) on your equipment rack to verify that the rack conforms to the measurements shown in the following figure.

Figure 11: Verifying Equipment Rack Dimensions



Procedure

Step 1 Mark and measure the distance between two holes on the left and right mounting rails.

The distance should measure 18.31 inches ± 0.06 inches (46.5 cm ± 0.15 cm).

Note
Measure for pairs of holes near the bottom, middle, and top of the equipment rack to ensure that the rack posts are parallel.

Step 2 Measure the space between the inner edges of the left front and right front mounting flanges on the equipment rack.

The space must be at least 17.7 inches (45 cm) to accommodate the chassis that is 17.25 inches (43.8 cm) wide and fits between the mounting posts on the rack.

Attaching the front rack-mount brackets

Before you begin

Before installing the chassis in the rack, you must install the rack-mount brackets on each side of the chassis.

Determine where in the rack you want the chassis to be mounted. If you are mounting more than one chassis in the rack, then start from the bottom up or the center of the rack. The following figure shows the brackets attached to the chassis. Depending on the bracket holes you use, the chassis may protrude in the rack.

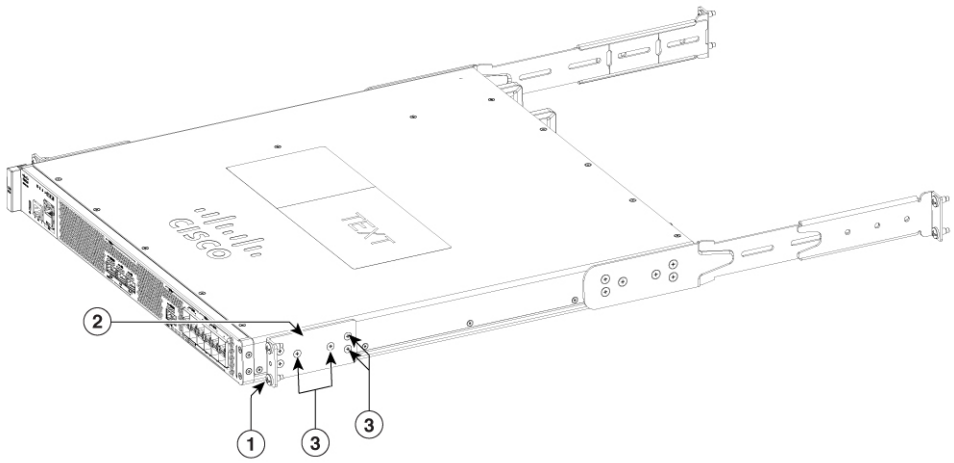
Note The cable-management brackets are attached to the chassis after you install the chassis rack-mount brackets on the chassis and mount the chassis in the rack.

Procedure

Step 1 Locate the threaded holes on the side of the chassis. Ensure that you hold the front rack-mount bracket with the ear and holes facing outward and towards the front of the chassis.

The following figures show where to attach the front rack-mount brackets to the Cisco 8500 Series Secure Routers.

Figure 12: Attaching the Front Rack-Mount Brackets to the Cisco 8500 Series Secure Routers



Step 2 Position the front rack-mount bracket top hole with the chassis, first top hole behind the side vent holes.

Step 3 Insert and tighten the black screws on one side.

Step 4 Repeat Step 1 through Step 3 on the other side of the chassis. Use screws to secure the rack-mount brackets to the chassis. Note, use the screw specified in the Bill of Materials (BOM).

Attaching the rear rack-mount brackets

Before you begin

Note This procedure is not required if you are installing the chassis in a two-post rack.

Before installing the chassis in a four-post rack, you must install the rear rack-mount brackets on each side of the chassis.

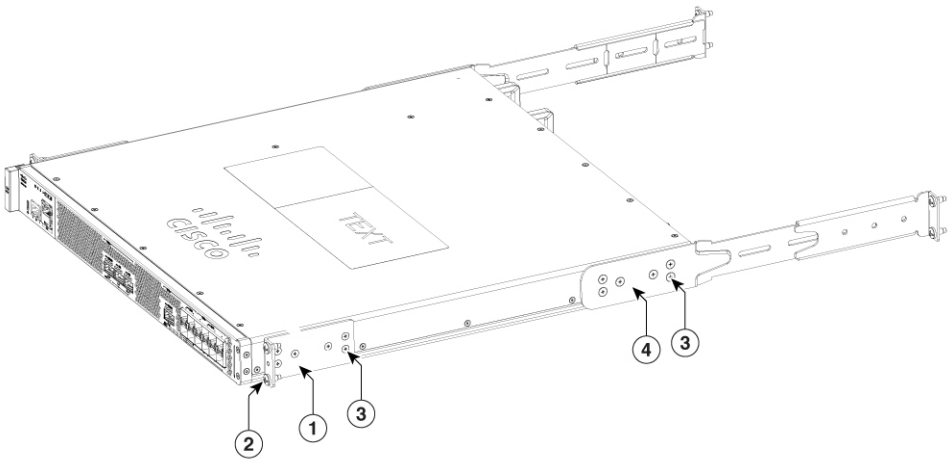
Determine where in the rack you want the chassis to be mounted. If you are mounting more than one chassis in the rack, then start from the bottom up or the center of the rack. The following figure shows the brackets attached to the chassis.

Procedure

Step 1 Locate the threaded holes on the side of the chassis. Ensure that you hold the rear rack-mount bracket with the ear and holes facing outward and towards the rear of the chassis.

The following figures show where to attach the rear rack-mount brackets to the Cisco 500 Series Secure Routers

Figure 13: Attaching the Rear Rack-Mount Brackets to the Cisco 500 Series Secure Routers



Step 2 Position the rear rack-mount bracket with the chassis.

Step 3 Insert the black screws on one side. Do not fully tighten the screws.

The rear bracket holes are slotted to allow for adjustment. Do not fully tighten the screws until the chassis is installed in the four-post rack.

Step 4 Repeat Step 1 through Step 3 on the other side of the chassis. Use black screws to secure the rack-mount brackets to the chassis.

Mounting the router in the rack

After installing the rack-mount brackets on the chassis, mount the chassis by securing the rack-mount brackets to two posts or mounting strips in the rack using the screws provided. Because the rack-mount brackets support the weight of the entire chassis, ensure that you use all the screws to fasten the two rack-mount brackets to the rack posts.

Two-post rack installation

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

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

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

The Cisco 8500 Series Secure Routers can be installed on a two-post rack, either 19 inch or 23 inch. We recommend that you allow at least 1 or 2 inches (2.54 or 5.08 cm) of vertical clearance between the router and any equipment directly above and below it.

Procedure

Step 1 On the chassis, ensure that all the screw fasteners on the installed components are securely tightened.

Step 2 Make sure that your path to the rack is unobstructed. If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

Step 3 (Optional) Install a shelf in the rack to support the Cisco 8500 Series Secure Routers . If you use a shelf, it helps support the chassis while you secure it to the rack.

Note
If you are using a shelf, place the chassis on the shelf and slightly raise the front of the chassis to align the mounting bracket holes with the rack post holes while allowing the bottom of the chassis to rest on the shelf.

Step 4 With two people, lift the chassis into position between the rack posts.

Step 5 Align the mounting bracket holes with the rack post holes and attach the chassis to the rack.

Step 6 Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.

Tip
To allow space to attach the cable-management brackets to the chassis in the rack easily, use the rack-mount bracket ear holes mentioned in Steps 7 and 8.

Step 7 Hold the chassis in position against the mounting rails in the equipment rack and follow these steps:

a) Insert the bottom screw into the second hole up from the bottom of the rack-mount ear and use a hand-held screwdriver to tighten the screw to the rack rail.

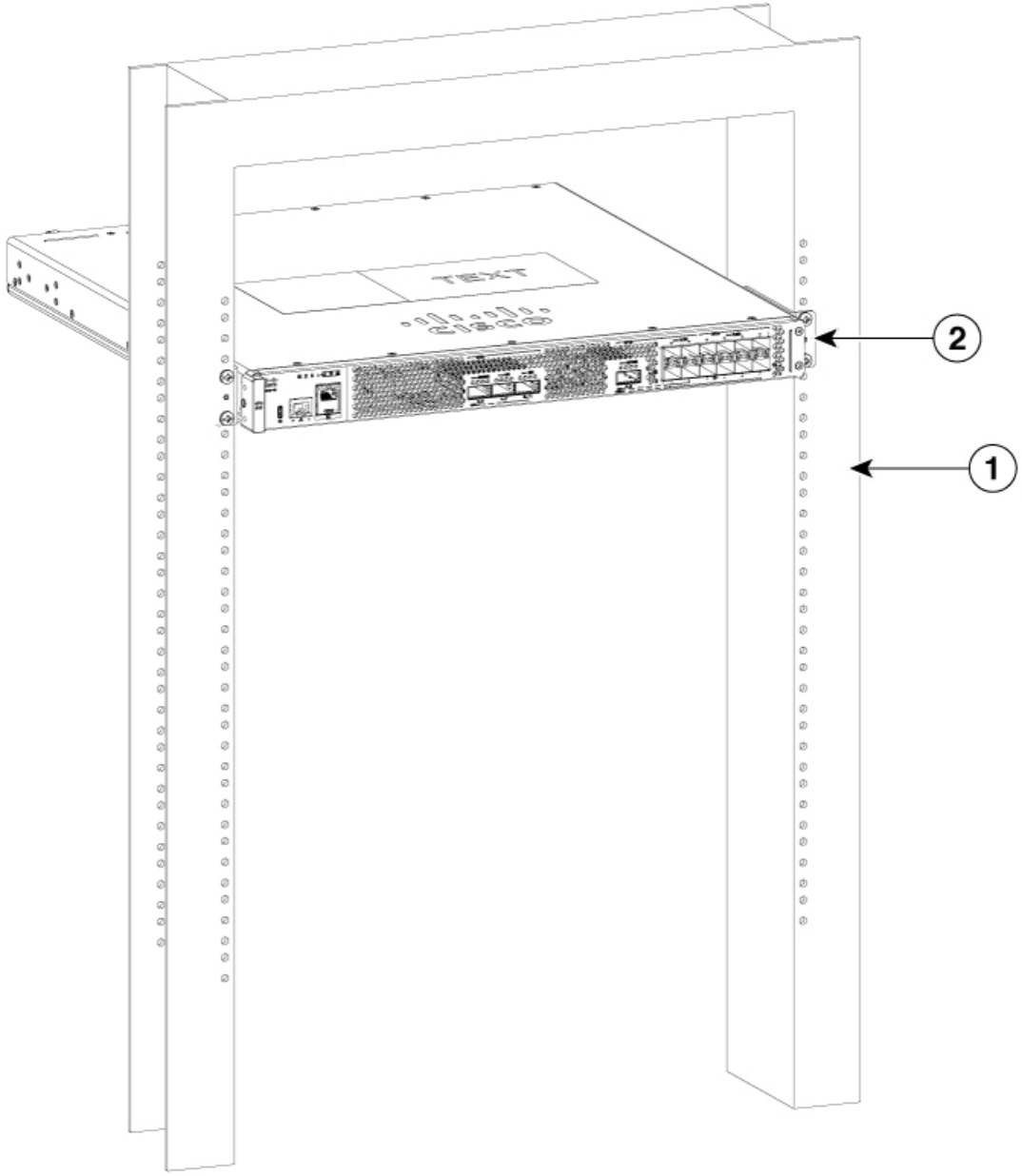
Tip
To make installation easier, insert one screw at the bottom of the chassis and the next screw at the top of the chassis diagonally from the first screw.

b) Insert the top screw into the second hole from the top of the rack-mount ear diagonally from the bottom screw and tighten the screw to the rack rail.
c) Insert the rest of the screws to secure the chassis to the rack equipment.

Step 8 Tighten all the screws on each side to secure the chassis to the equipment rack.

The following figures show the Cisco 8500 Series Secure Routers on a two-post equipment rack.

Figure 14: Cisco 8500 Series Secure Routers Installed on a Two-Post Equipment



Rad

1	Rack equipment rail	2	Rack mount bracket ear and screws

Four-post rack installation

Procedure

Step 1 (Optional) Install a shelf in the rack to support Cisco 8500 Series Secure Routers . If you use a shelf, it helps support the chassis while you secure it to the rack.

Note
If you are using a shelf, place the chassis on the shelf and slightly raise the front of the chassis to align the mounting bracket holes with the rack post holes while allowing the bottom of the chassis to rest on the shelf.

Step 2 With two people, lift the chassis into position between the rack posts.

Step 3 Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.

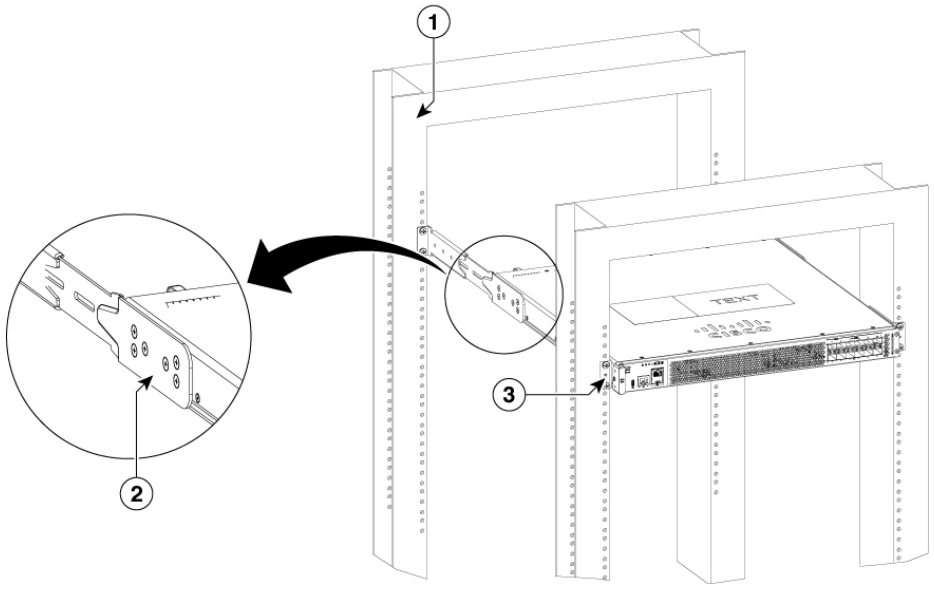
Note
Use the second hole up from the bottom of the rack-mount bracket and the second hole down from the top of the rack-mount bracket. This will make it easier to attach the cable-management bracket to the chassis in the equipment rack.

Step 4 Hold the chassis in position against the mounting rails while the second person finger-tightens a screw to the rack rails on each side of the chassis.

Step 5 Finger-tighten screws to the rack rails on each side of the chassis.

Step 6 Tighten all the screws on each side to secure the chassis to the equipment rack.

Figure 15: The Cisco 8500 Series Secure Routers in a Four-Post Rack—Front and Rear



Rack-Mounting

1	Rear rack equipment rail	3	Front rack mount bracket ear and screws
2	Rear rack mount bracket ear and screws		

Step 7 Use a level to verify that the tops of the two brackets are level, or use a measuring tape to verify that both brackets are the same distance from the top of the rack rails.

Attaching the cable management bracket

The cable management brackets should be mounted to each rack-mount bracket on the chassis to provide cable management to both sides of the chassis (parallel with card orientation). These brackets are screw-mounted to the rack-mount brackets to allow easy installation and removal of cables.

The cable-management brackets for the Cisco 8500 Series Secure Routers contain one independent cable-management U-type feature with two screws for each bracket.

Note Make certain that the cable-management bracket "U" feature is facing upwards when you attach it to the Cisco 8500 Series Secure Routers .

Procedure

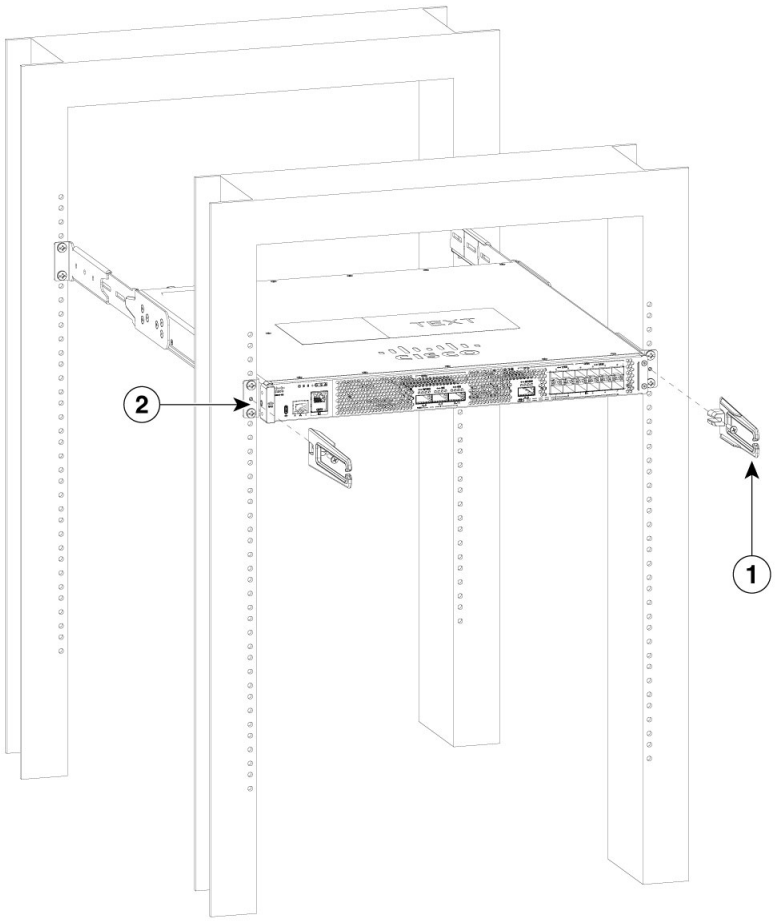
Step 1 Align the cable-management bracket to the rack-mount bracket on one side of the Cisco 8500 Series Secure Routers. The cable-management bracket aligns to the top hole of the chassis rack-mount bracket.

Step 2 Using a Phillips screwdriver, insert one screw through the top screw hole of the cable-management bracket and into the chassis rack-mount bracket and tighten the screw.

Note
Use the package of screws that came with your chassis containing four screws.

The following figure show where to attach the cable-management brackets to the Cisco 8500 Series Secure Routers.

Figure 16: Attaching the Cable-Management Brackets to the router



1	Front cable-management bracket.
2	Front-rack mount bracket.

Step 3 Insert a screw through the hole in the cable management bracket and tighten using a Phillips screwdriver.

Step 4 Repeat Step 1 through Step 3 for the other side of the chassis.

Chassis ground connection

Connecting the Cisco 8500 Series Secure Routers chassis to ground is required for all DC powered installations and any AC powered installation where compliance with Telcordia grounding requirements is necessary.

Warning **Statement 1024—**Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Before you connect power or turn on power to your chassis, you must provide an adequate chassis ground (earth) connection for the chassis. A chassis ground connector is provided on Cisco 8500 Series Secure Routers. There is a stud on the rear left side of the chassis.

When customer properly install the chassis in a grounded rack, the switch is grounded because it has a metal-to-metal connection to the rack. Alternatively, customer can ground the chassis by using a customer-supplied grounding cable that meets your local and national installation requirements.

For U.S. installations, 6-AWG wire is recommended. Connect the grounding cable to the chassis with a grounding lug and to the facility ground.

Caution The grounding wire should always be the first to be installed or connected and the last to be removed or disconnected.

Note An electrical conducting path shall exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted, or to a grounding conductor. Electrical continuity shall be provided by using thread-forming type mounting screws that remove any paint or non-conductive coatings, and establish a metal-to-metal contact. Any paint or non-conductive coatings shall be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.

Have the recommended tools and supplies available before you begin this procedure.

Recommended tools and supplies

The following tools, equipment, and supplies are necessary to connect the system ground to the chassis:

- Phillips screwdriver
- 3.5-mm flat blade screwdriver (Phoenix # 1205053 or equivalent 3.5-mm flat blade)
- Dual-lug chassis ground component
- Grounding wire

Attaching a chassis ground connection

Procedure

Step 1 Use the wire stripper to strip one end of the AWG #6 wire approximately 0.75 inches (19.05 mm).

Step 2 Insert the AWG #6 wire into the open end of the grounding lug.

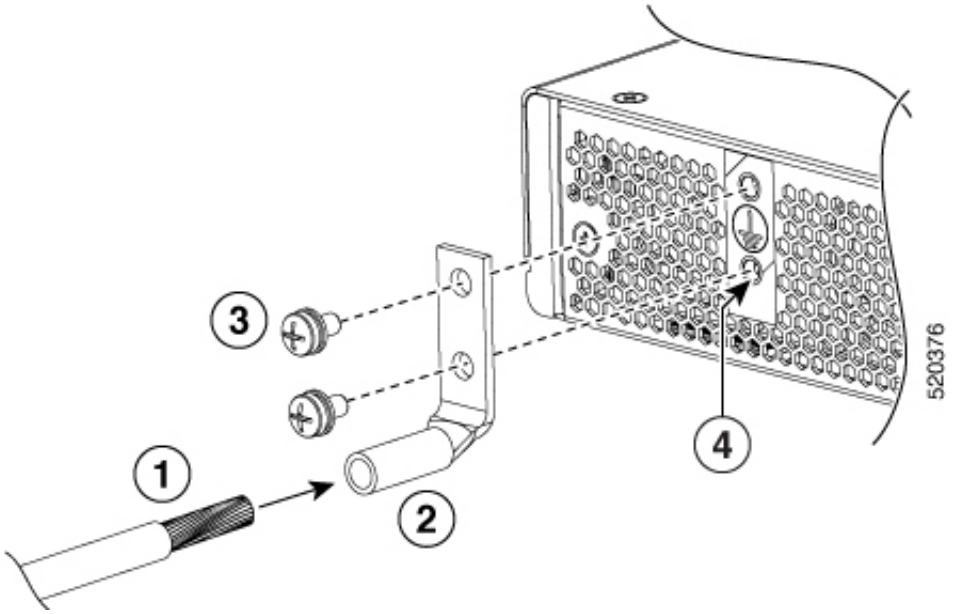
Step 3 Use the crimping tool to carefully crimp the wire receptacle around the wire. This step is required to ensure a proper mechanical connection.

Step 4 Locate the chassis ground connector on the rear of your chassis.

Step 5 Insert the two screws through the holes in the grounding lug. Note, use the screw specified in the Bill of Materials (BOM)

The following figures show how to attach a grounding lug to the chassis ground connector.

Figure 17: Attaching a Grounding Lug to the C8550-G2 and C8570-G2 Chassis Ground Connector



1	Chassis ground lead wire	3	Ground screws
2	Grounding lug	4	Chassis ground connector holes

Step 6 Use the Number 2 Phillips screwdriver to carefully tighten the screws until the grounding lug is held firmly to the chassis. Do not over tighten the screws.

Step 7 Connect the opposite end of the grounding wire to the appropriate ground location on the rack grounding point at your site to ensure an adequate chassis ground.

Connecting cables

Keep the following guidelines in mind when connecting any external cable to the Cisco 8500 Series Secure Routers:

- To reduce the chance of interference, avoid crossing high-power lines with any interface cables.
- Verify all the cabling limitations (particularly distance) before powering on the system.

Connecting the console port cables

The router uses RJ-45 port to attach a console terminal. The router has an asynchronous serial (EIA/TIA-232) RJ-45 console port labeled CON on its front panel. You can connect this port to most types of video terminals with a console cable kit that is included with your router. The console cable kit contains:

- One RJ-45-to-RJ-45 crossover cable

A crossover cable reverses pin connections from one end to the other. In other words, it connects pin 1 (at one end) to pin 8 (at the other end), pin 2 to pin 7, pin 3 to pin 6, and so on. You can identify a crossover cable by comparing the two modular ends of the cable. Hold the cable ends in your hand, side-by-side, with the tabs at the back. Ensure that the wire connected to the outside (left) pin of the left plug (pin 1) is the same color as the wire connected to the outside (right) pin of the right plug (pin 8).

The console port is an asynchronous serial ports; devices connected to this ports must be capable of asynchronous transmission. Baud rates for the RJ-45 console port are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 bps.

Before connecting to the console interface on the router using a terminal or PC, perform the following steps:

Procedure

Step 1 Before connecting a terminal to the console port, configure the terminal to match the chassis console port as follows: 9600 baud, 8 data bits, no parity, 1 stop bits (9600 8N1).

Step 2 Connect one end of the RJ-45 cable to the serial RJ-45 console port (CON) .

Note
For information about how to change the default settings to meet the requirements of your terminal or host, see the *Cisco IOS Terminal Services Configuration Guide*.

Step 3 (Optional) After you establish normal router operation, you can disconnect the terminal.

Connecting to the USB 3.0 console interface

The USB 3.0 interface connects directly to the USB connector of a PC using a USB Type A to 5-pin micro USB Type-B cable. The USB 3.0 interface supports full speed (12Mbps) operation. The interface does not support hardware flow control.

Note

- Always use shielded USB cables with a properly terminated shield. The USB serial console interface cable must not exceed 3 meters in length.
- Only one interface can be active at a time. When a cable is plugged into the USB 3.0 interface, the RJ-45 port becomes inactive. Conversely, when the USB cable is removed from the USB 3.0 interface, the RJ-45 port becomes active.
- 4-pin micro USB Type-B connectors are easily confused with 5-pin micro USB Type-B connectors. Note that only the 5-pin micro USB Type-B is supported.

The default parameters for the interface are 9600 baud, 8 data bits, no parity, and 1 stop bit.

For operation with a Microsoft Windows OS version older than Windows 7, the Cisco Windows USB Console Driver must be installed on any PC connected to the interface. If the driver is not installed, prompts guide you through a simple installation process.

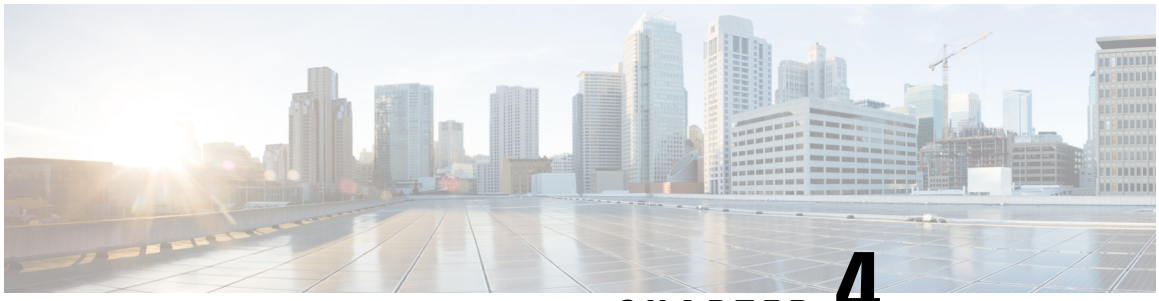
The Cisco Windows USB Console Driver allows plugging and unplugging the USB cable from the interface without affecting Windows HyperTerminal operations. No special drivers are needed for Mac OS X or Linux.

Management ethernet port cable connection

Procedure

Step 1 Insert an Ethernet RJ-45 cable into the MGMT port.

Step 2 Insert the other end of the RJ-45 cable to your management device or network.



CHAPTER 4

Removing and Replacing FRUs

This chapter describes procedures for removing and replacing field-replaceable units (FRUs) from Cisco 8500 Series Secure Routers.

Installing an SSD

Before you begin

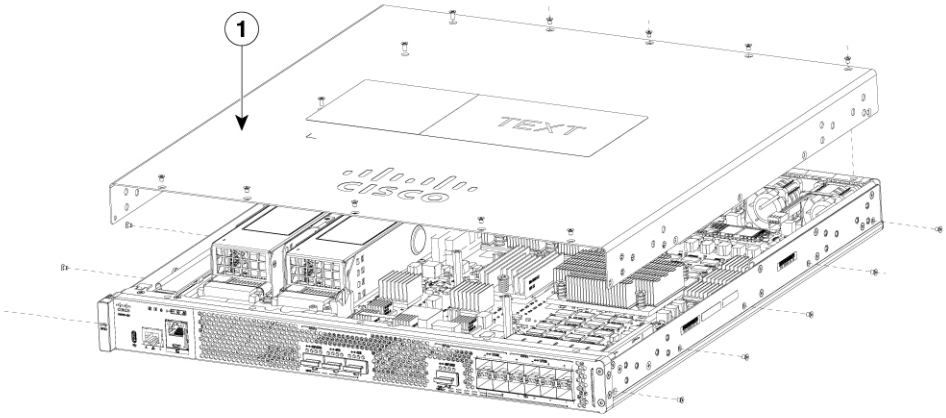
Perform the following steps before you begin the process of removing and replacing an SSD from a Cisco 8500 Series Secure Router:

- Use an ESD-preventive wrist strap.
- Back up the data that you want to save. To back up the data follow these steps.
  - Back up the data from the SSD to an external device (USB drive or remote file server).
  - Replace the SSD.
  - Install the required software on the new SSD.
  - Restore configurations and user data back to the new SSD.
- Remove the power supplies before you remove the chassis top cover.

Procedure

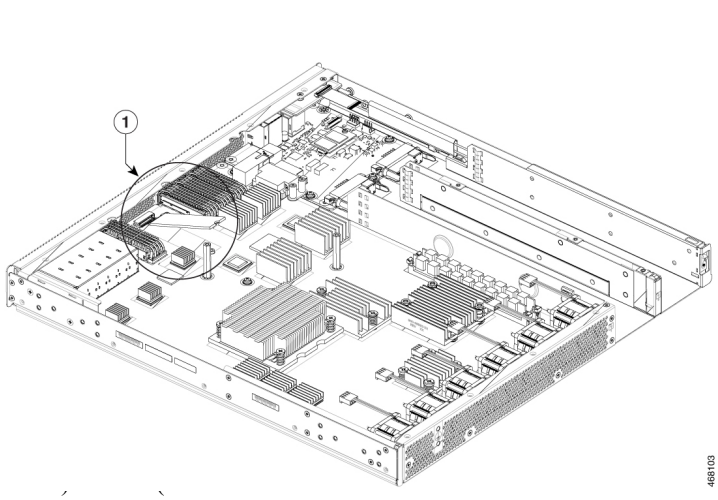
Step 1 Ensure the router is powered off and all the power supplies are removed from the chassis.

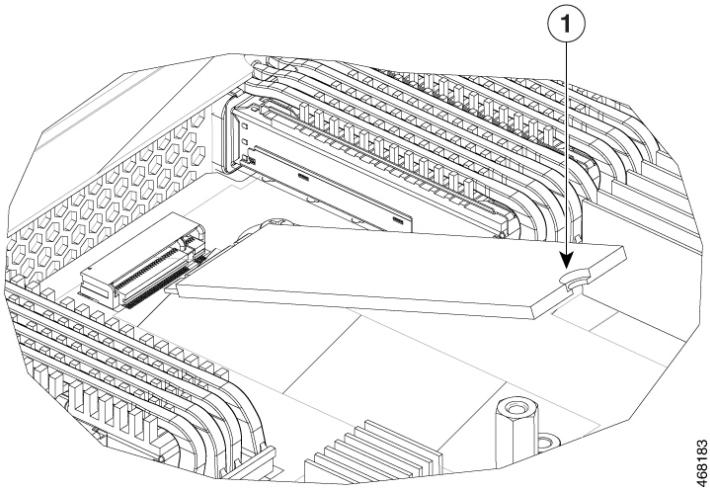
Step 2 If the unit is mounted on a rack, remove the unit from the rack. Then remove rack mount brackets from the side of the chassis. Remove the nine Torx screws on the top surface of the cover, along with the five Torx screws on each side of the cover, using a Torx T8 driver. Then, remove the remaining three screws on the top surface of the cover with a small Phillips screwdriver.



1	Top cover of the chassis after removing screws from the top and side

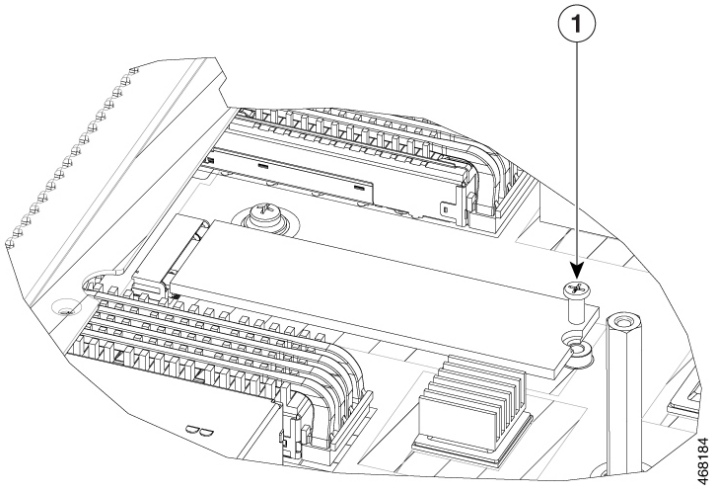
Step 3 Locate the SSD slot. Carefully insert the SSD at approximately a 30 degree angle to seat the card in the connector. Rotate the card downward until it rests on the small notch in the printed circuit





1	The SSD card inserted in the notch in the PCB

Step 4 Install the retention screw in the hole in the SSD and gently tighten to a torque to no greater than 5 in-lbs



Step 5 Re-install the cover and replace all screws that were removed in step 1.

Removing an SSD

Before you begin

Perform the following steps before you begin the process of removing and replacing an SSD from a Cisco 8500 Series Secure Routers:

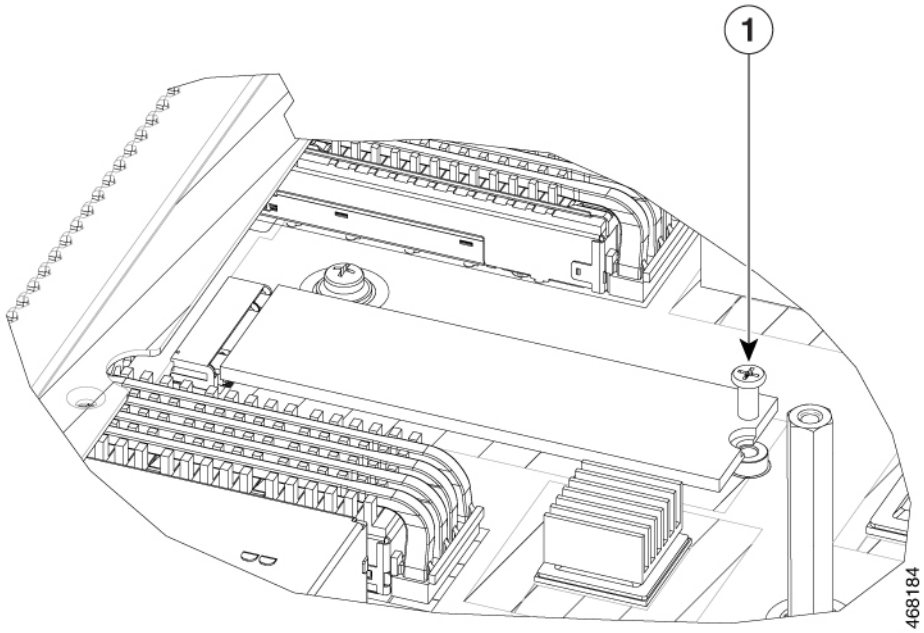
- Use an ESD-preventive wrist strap.
- Back up the data that you want to save.
- Remove the power supplies before you remove the chassis top cover.

Procedure

Step 1 Ensure the router is powered off and all the power supplies are removed from the chassis.

Step 2 If the unit is mounted on a rack, remove the unit from the rack. Then remove rack mount brackets from the side of the chassis. Remove the nine Torx screws on the top surface of the cover, along with the five Torx screws on each side of the cover, using a Torx T8 driver. Then, remove the remaining three screws on the top surface of the cover with a small Phillips screwdriver.

Step 3 Remove the screw retaining the SSD. Keep the screw for inserting a new SSD



module.

1	The screw retaining the SSD

Step 4 After the screw is removed, the SSD module will automatically spring up.

Step 5 Remove the SSD from the socket.

Installing AC power supplies

Note Do not install the power supplies with the chassis cover off.

Procedure

Step 1 Ensure that the chassis power switch on the chassis is in the Standby position.

Note
It is not required to place the chassis power switch in the Standby position if you want to hot-swap a single power supply.

Step 2 Insert the power supply module into the appropriate slot(s), making sure that the retention latch is firmly latched. You can verify that the power supply module is firmly latched by gently pulling the power supply handle.

Step 3 Insert the power supply cables firmly into the power supplies.

Note
Ensure that both power supplies are inserted firmly and the power cords are in place.

Step 4 If you have changed the chassis power switch to the Standby position in Step 1, press the power switch to the On position.

The power supply LEDs are illuminated (green).

Removing AC power supplies

Procedure

Step 1 Ensure that the chassis power switch is in the Standby position.

Note
It is not required to place the chassis power switch in the Standby position if you want to hot-swap a single power supply.

Step 2 Unplug the power cable from the power supply.

Step 3 Press the retaining latch towards the pull handle, grasp the handle with one hand, and pull the power supply out of the slot while supporting the weight of the power supply with the other hand.

Step 4 Repeat these steps if it is required to remove the other AC power supply.

Installing DC input power supplies

Warning **Statement 1003—**Power Disconnection

To reduce risk of electric shock, before performing any of the following procedures, ensure that power is removed from the system.

Note Do not install the power supplies with the chassis cover off.

This section describes how to install the DC power supply input power leads to the DC input power supply. Before you begin, read these important notices:

- The color coding of the DC input power supply leads depends on the color coding of the DC power source at your site. Ensure that the lead color coding you choose for the DC input power supply matches the lead color coding used at the DC power source and verify that the power source is connected to the negative (–) terminal and to the positive (+) terminal on the power supply.

- Ensure that the chassis ground is connected on the chassis before you begin installing the DC power supply. Follow the steps provided in the *Chassis Ground Connection* section.
- For DC input power cables, the wire gauge is based on the National Electrical Code (NEC) and local codes for 26 amp service at nominal DC input voltage (–40/–72 VDC). One pair of cable leads, source DC (–) and source DC return (+), are required for each power distribution unit (PDU). These cables are available from any commercial cable vendor. All DC input power cables for the chassis should be 10 gauge wire and cable lengths should match within 10 percent of deviation.

Each DC input power cable is terminated at the PDU by a cable lug, as shown in the following figure.

Note DC input power cables must be connected to the PDU terminal studs in the proper positive (+) and negative (–) polarity. In some cases, the DC cable leads are labeled, which is a relatively safe indication of the polarity. However, 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 power distribution unit.

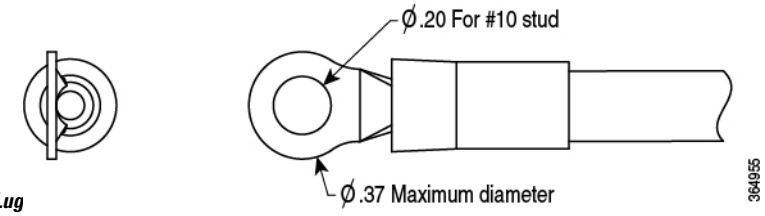


Figure 18: DC Input Power Cable Lug

Note To avoid hazardous conditions, all exposed conductors must be covered. If after placing the protective cover over the DC terminal block, conductors are exposed, these should be insulated to prevent accidental contact.

Wiring the DC input power source

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

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

Procedure

Step 1 Turn off the circuit breaker from the power source.

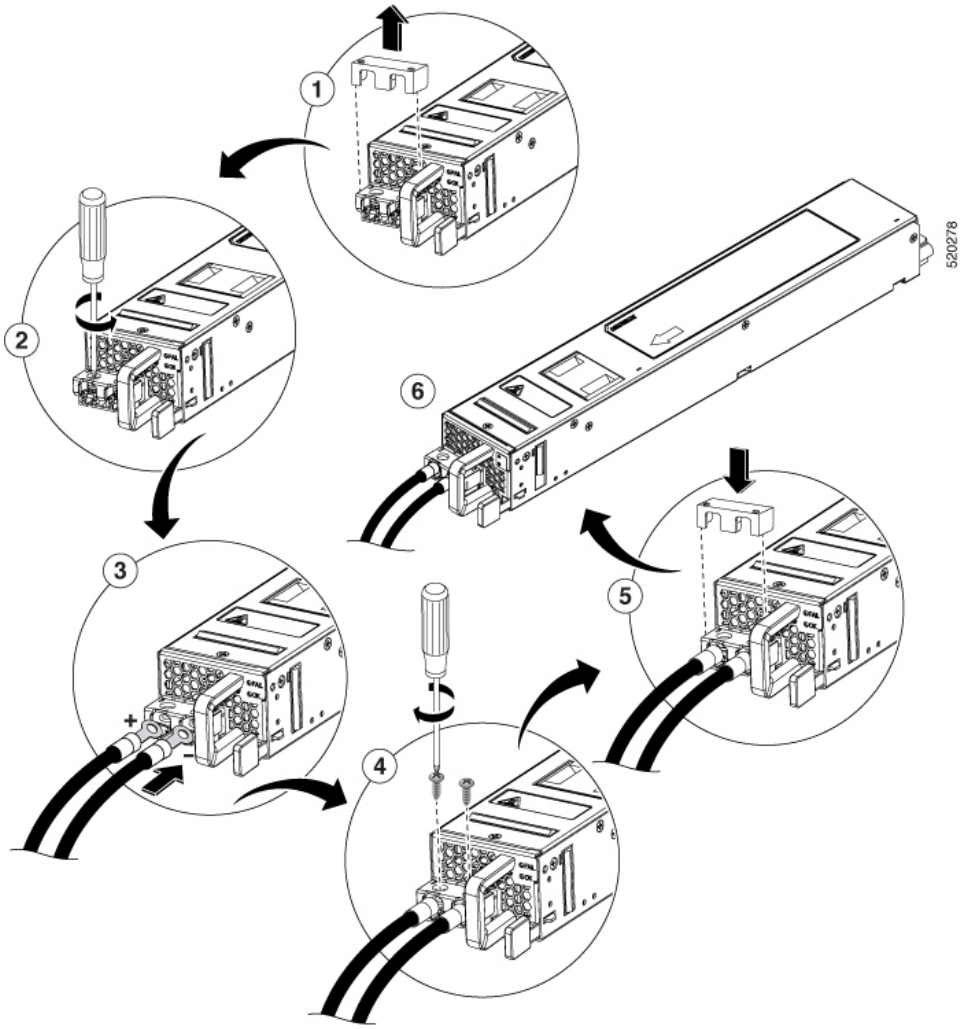
Step 2 Ensure that the chassis power switch is in the Standby position.

Note
It is not required to place the power switch in the Standby position if you want to hot-swap a single power supply.

Step 3 Use a wire-stripping tool to remove approximately 0.75 inch (19 mm) of the covering from the end of the wire.

The wire should be stripped so that it extends into the barrel of the lug without extending out of it. Additionally, the insulation should not be inside the barrel.

Figure 19: DC Power Supply Terminal Block Ground Cable Lugs



Step 4 Insert the stripped end of the wire into the open end of the lug.

Step 5 Crimp the wire in the barrel of the lug. Verify that the wire is securely attached to the lug.

Step 6 Place the wire against the terminal block, making sure there is solid metal to metal contact.

Step 7 Secure the lugs to the chassis with two M4 screws. Ensure that the lug and the wire will not interfere with other switch hardware or rack equipment.

Step 8 Replace the snap on cover on the terminal block of the DC power supply.

Removing DC power supplies

The DC power supply has a terminal block that is installed into the power supply terminal block header.

Procedure

Step 1 Turn off the circuit breaker from the power source.

Step 2 Ensure that the chassis power switch is in the Standby position.

Note
It is not required to place the chassis power switch in the Standby position if you want to hot-swap a single power supply.

Step 3 Remove the plastic cover from the terminal block.

Step 4 Unscrew the two terminal block screws on the unit and remove the wires from the power supply.

Step 5 Press the power supply retaining latch towards the pull handle, grasp the handle with one hand, and pull the power supply out of the slot while supporting the weight of the power supply with the other hand.

Removing and replacing USB 3.0 interface

The Cisco 8500 Series Secure Router contain one USB 3.0 interface to store configurations or Cisco IOS XE consolidated packages.

To remove and then replace a USB flash memory stick, follow these steps:

Procedure

Step 1 Pull the flash memory stick from the USB port.

Step 2 To replace a Cisco USB Flash memory stick, insert the module into USB port 1. The Flash memory stick can be inserted or removed regardless of whether the router is powered up or not.

Removing and replacing a DIMM

The Cisco 8500 Series Secure Router has two DIMM slots and supports 16-GB configuration by default.

Table 6: Supported Slots for Inserting the DIMMs

Memory PID Option	Memory Channel B	
	Slot 0 (U1DA0)	Slot 2 (U1DB0)

Memory PID Option	Memory Channel B	
MEM-C85G2-32GB	16 GB	16 GB
MEM-C85G2-64GB	32 GB	32 GB

Removing a DIMM

Before you begin

Perform the following steps before you begin the process of removing and replacing a DIMM from a Cisco 8500 Series Secure Router:

- Use an ESD-preventive wrist strap.
- Back up the data that you want to save.
- Remove the power supplies before you remove the chassis top cover.

Procedure

Step 1 With an ESD wrist strap on, remove the power supplies from the chassis.

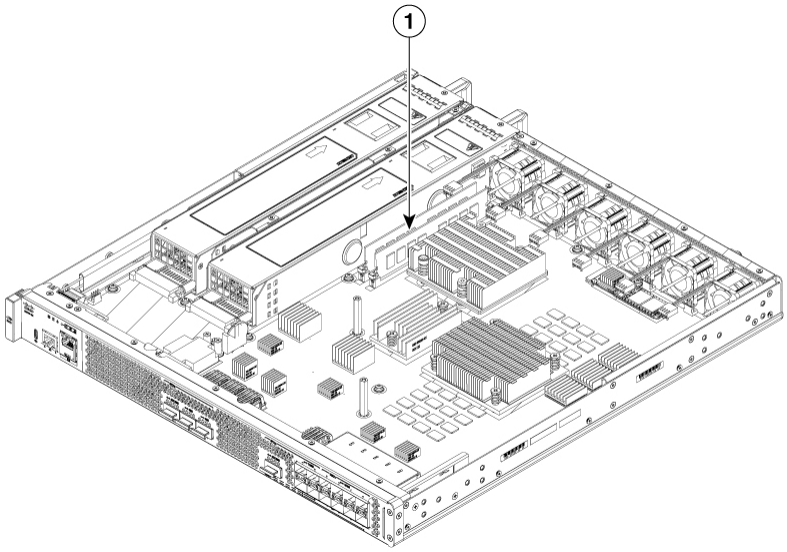
Step 2 Remove the chassis top cover by performing the following steps:

a) Remove the nine Torx screws on the top surface of the cover, along with the five Torx screws on each side of the cover, using a Torx T8 driver. Then, remove the remaining three screws on the top surface of the cover with a small Phillips screwdriver.

b) After removing the screws, lift off the chassis cover.

Step 3 Locate the DIMMs on the router.

Figure 20: DIMM Location in Cisco 8500 Series Secure Router



1	Cisco 8500 Series Secure Router DIMM location slot

Step 4 Pull down the DIMM module spring latches to release the corresponding DIMM from the socket.

Step 5 When both ends of the DIMM are released from the socket, grasp each end of the DIMM with your thumb and forefinger and pull the DIMM completely out of the socket. Handle only the edges of the DIMM; avoid touching the memory module, pins, and the metal traces (the metal fingers along the connector edge of the DIMM) along the socket edge.

Step 6 Place the DIMM in an antistatic bag to protect it from ESD damage.

Replacing a DIMM

Procedure

Step 1 Place the DIMM on an antistatic mat or pad while wearing an antistatic device, such as a wrist strap.

Caution
DIMMs are sensitive components that can be shorted by mishandling; they are susceptible to ESD damage. Handle the DIMM by the edges only, and avoid touching the pins.

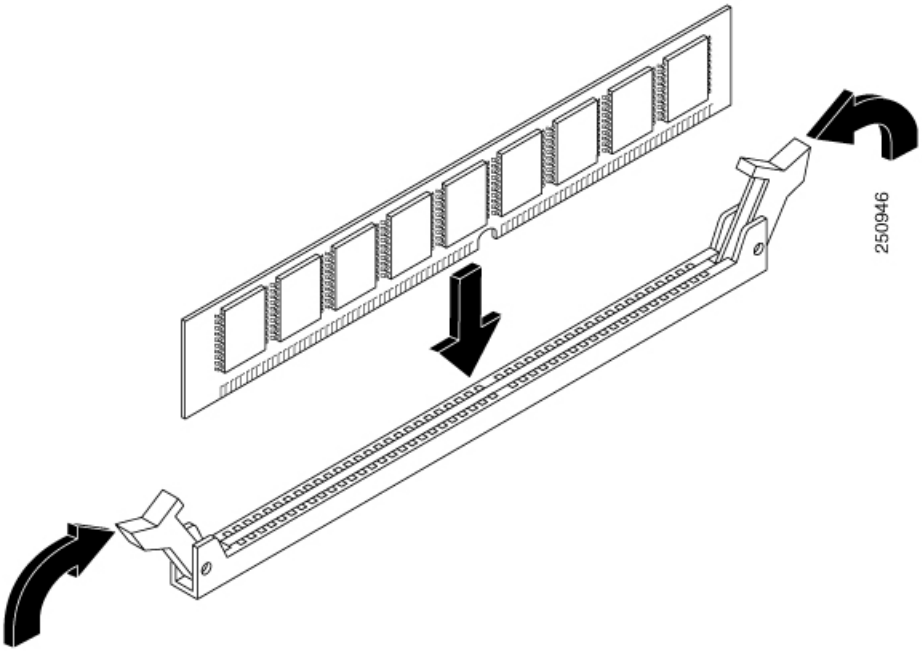
Step 2 Remove the new DIMM from the antistatic bag.

Step 3 Locate the keying notch and align the DIMM with the socket before inserting it.

Step 4 Gently insert the new DIMM, taking care not to damage the pins on the edge of the DIMM. Press the top of the DIMM towards the socket, being careful to apply force only on the DIMM that is parallel with the plane of the DIMM.

Caution
When inserting DIMMs, use firm but not excessive pressure. If you damage a socket, you will have to return the router to the factory for repair.

Figure 21: Installing a DIMM in the Socket



Step 5 After the DIMM is installed, check whether the release levers are flush against the sides of the DIMM socket. If they are not, the DIMM might not be seated properly. If the DIMM appears misaligned, carefully remove it according to the removal procedure and then reseat it in the socket. Push the DIMM firmly back into the socket until the release levers are flush against the sides of the DIMM socket.

Step 6 Replace the chassis top cover. Install the top surface screws, side screws and tighten them slightly

Step 7 Install the power supplies into the chassis and power up the router.

Removing and replacing fans

Removing the fans for Cisco 8500 Series Secure Routers

Before you begin

Remove the chassis from the rack and place it on a table top to perform this task.

Perform the following steps before you begin the process of removing the fans :

- Use an ESD-preventive wrist strap.
- Back up the data that you want to save.
- Remove the power supplies before you remove the chassis top cover.

Procedure

Step 1 Remove the chassis top cover by performing the following steps:

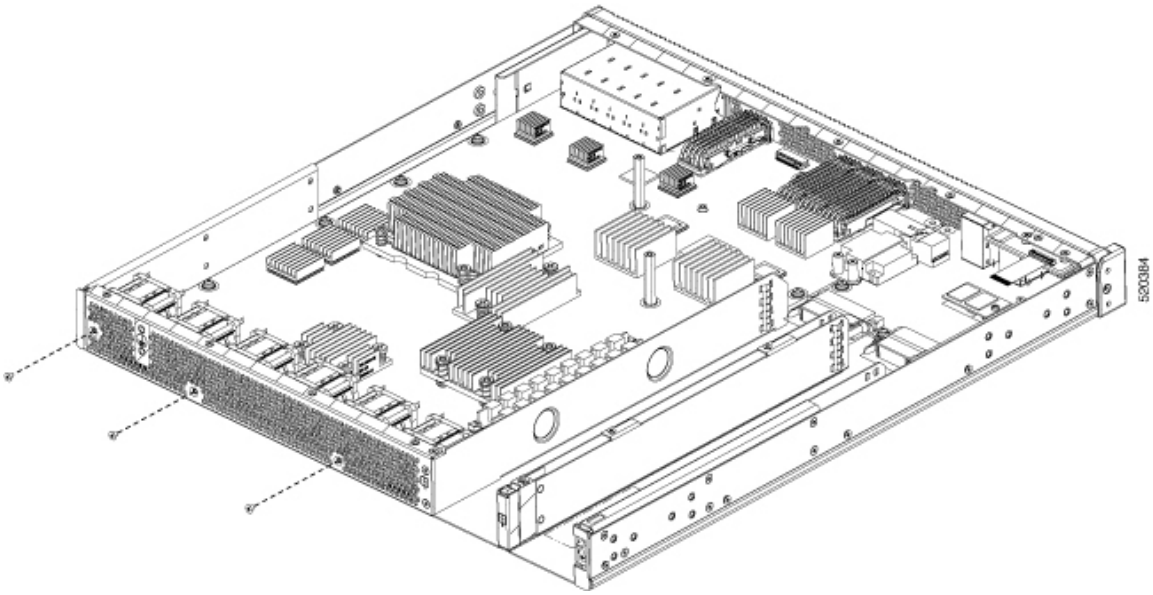
a) Remove the twelve top surface screws on the chassis cover.
b) Remove the five screws from the left side of the chassis and five screws from the right side of the chassis.
c) Lift the chassis cover. Note, use the screw specified in the Bill of Materials (BOM).

Step 2 Position the chassis so that you have the most comfortable access to the chassis to remove the fans.

The fans are located at the rear of the chassis.

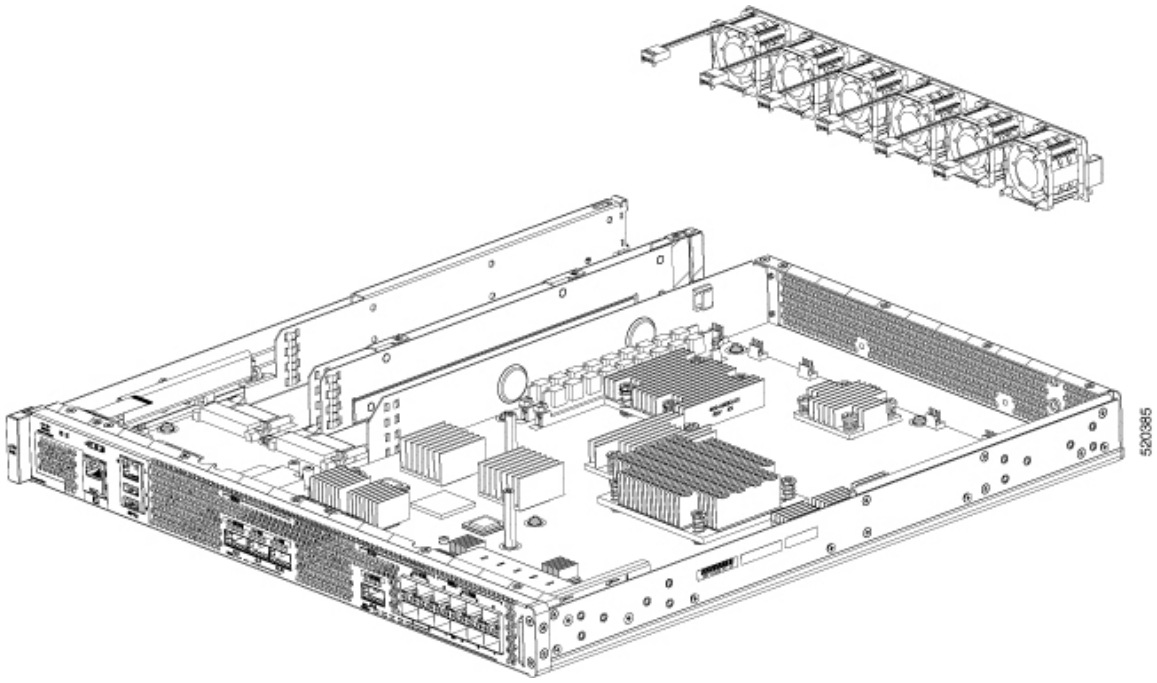
Step 3 Unplug the six fan connectors from the motherboard.

Step 4 Remove the three screws from the rear of the chassis as shown in the following figure. Note, use the screw specified in the Bill of Materials (BOM).



Step 5 Rotate the fan tray slightly rotate the top of the fan tray slightly into the chassis internals, and then lift it out of the chassis.

Step 6 Reverse the order of fan removal to install the new fan tray. Ensure that all fans are connected and all screws for the fan tray and chassis cover are replaced prior to powering up the chassis.



Installing and removing small-form pluggable modules

Install and remove SFP and SFP+ modules

Before you begin

See the Cisco Optics-to-Device Compatibility Matrix for a list of supported SFP and SFP+ modules. Use only supported SFP/SFP+ modules on the platform.

Warning Class 1 laser product. Statement 1008

Note We recommend that you wait 30 seconds between removal and insertion of an SFP on an interface module. This time is recommended to allow the transceiver software to initialize and synchronise with the standby RSP. Changing an SFP more quickly could result in transceiver initialization issues that disable the SFP

- Do not remove the dust plugs from the SFP and SFP+ 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 and SFP+ module can shorten its useful life. Do not remove and insert any SFP/SFP+ 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.
- When you insert several SFP and SFP+ modules in multiple ports, wait for 5 seconds between inserting each SFP/SFP+. This will prevent the ports from going into error disabled mode. Similarly, when you remove an SFP and SFP+ from a port, wait for 5 seconds before reinserting it.

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/SFP+ module.

On some SFP/SFP+ 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/SFP+ module has a bale-clasp latch, move it to the open, unlocked position.

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

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

Step 6 Remove the SFP and SFP+ dust plugs and save.

Step 7 Connect the SFP and SFP+ cables.

Laser safety guidelines

Optical Small-Form Pluggable (SFPs) use a small laser to generate the fiber-optic signal. Keep the optical transmit and receive ports covered whenever a cable is not connected to the port.

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

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

Warning Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019. Statement 1255.

To install an SFP module in your device, perform these steps:

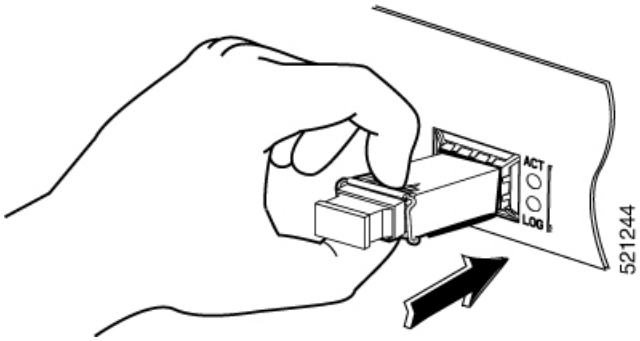
Procedure

Step 1 Read the Safety Warnings section and attach an ESD-preventive wrist strap to your wrist and to the ESD ground connector or a bare metal surface on your chassis.

Step 2 Slide the SFP into the device connector until it locks into position

Tip
If the SFP uses a bale-clasp latch (see Laser Safety Guidelines section, the handle should be on top of the SFP module.

Figure 22: Install a Small-Form Pluggable Module



Caution
Do not remove the optical port plugs from the SFP until you are ready to connect cabling.

Step 3 Connect the network cable to the SFP module.

Remove small form pluggable modules

Follow these steps to remove a Small Form Pluggable (SFP) from the device:

Procedure

Step 1 Read the Safety Warnings section and disconnect the power supply before you perform any module replacement.

Step 2 Disconnect all cables from the SFP.

Warning
Statement 1051—Laser Radiation

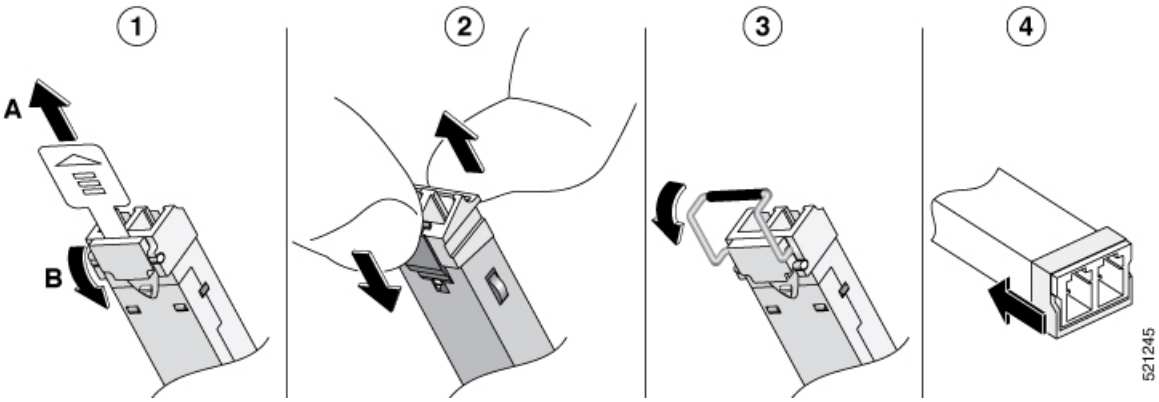
Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.

Caution
The latching mechanism used on many SFPs locks the SFP into place when cables are connected. Do not pull on the cabling in an attempt to remove the SFP.

Step 3 Disconnect the SFP latch.

Note
SFP modules use various latch designs to secure the module in the SFP port. Latch designs are not linked to SFP model or technology type. For information on the SFP technology type and model, see the label on the side of the SFP.

Figure 23: Disconnecting SFP Latch Mechanisms



1	Sliding latch	3	Bale-clasp latch
2	Swing and slide latch	4	Plastic collar latch

Tip
Use a pen, screwdriver, or other small straight tool to gently release a bale-clasp handle if you cannot reach it with your fingers.

Step 4 Grasp the SFP on both sides and remove it from the device.

Repacking the router

If your system is damaged, you must repack it for return shipment.

Before you return the router or move the router to a different location, repack the system using the original packaging material.