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:

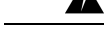
- 20 A U.S.

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.

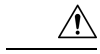
Preventing electrostatic discharge damage

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

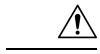
system. To prevent static damage, discharge static electricity from your body before you touch any of your system components, such as a microprocessor. As you continue to work on your system, periodically touch an unpainted metal surface on the computer chassis.

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 1: 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.