Prepare for installation

This chapter provides preinstallation information, such as recommendations and requirements that must be met before installing the routers. Before you begin, inspect all items for shipping damage. If anything appears to be damaged or if you encounter problems installing or configuring your router, contact customer service.

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Warning **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:

Gigabit Ethernet WAN port

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Warning **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:

Gigabit Ethernet WAN port

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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 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:

Gigabit Ethernet WAN port

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

This equipment is suitable for installations using the CBN.

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

This equipment is suitable for installation in network telecommunications facilities.

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 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 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.

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 surface between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.

Safety recommendations

Follow these guidelines to ensure general safety:

- Never attempt to lift an object that might be too heavy for you to lift by yourself.

- Keep the chassis area clear and dust-free during and after installation.

- If you remove the chassis cover, place it in a safe place.

- Keep tools and chassis components away from walk areas.

- Do not wear loose clothing that may get caught in the chassis. Fasten any tie or scarf and roll up sleeves.

- Wear safety glasses when working under conditions that might be hazardous to your eyes.

- Do not perform any action that may create a hazard to people or makes equipment unsafe.

Safety with electricity

Follow these guidelines when working on equipment powered by electricity:

- Locate the emergency power-off switch in the room in which you are working. If an electrical accident occurs, you can quickly turn off the power.

- Disconnect all power before doing the following:

    - Installing or removing a chassis.

    - Working near power supplies.

- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.

- Do not work alone if hazardous conditions exist.

- Never assume that power is disconnected from a circuit. Always check.

- Never open the enclosure of the power supply.

- If an electrical accident occurs to another person, proceed as follows:

  - Use caution; do not become a victim yourself.

  - Turn off power to the device.

  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.

  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Prevent electrostatic discharge damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It can occur if electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. Always follow these ESD prevention procedures when removing and replacing modules:

- Ensure that the router chassis is electrically connected to the ground.

- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to channel unwanted ESD voltages safely to ground. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.

- If no wrist strap is available, ground yourself by touching a metal part of the chassis.

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Caution   For the safety of your equipment, periodically check the resistance value of the anti-static strap. It should be between 1 and 10 megohms (Mohm).

General precautions

This section describes the requirements your site must meet for the safe installation and operation of your router. Ensure that the site is properly prepared before beginning installation. If you are experiencing shutdowns or unusually high errors with your existing equipment, the guidelines provided in this section can also help you isolate the cause of failures and prevent future problems.

- 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 that can cause fire or electric shock by shorting out interior components.

- Position system cables and power supply cables carefully. Route system cables and the power supply cable and plug so 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 electrical modifications at your site. 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.

Rack requirements

Some Cisco routers include brackets for use with a 19-inch rack or, if specified in your order, optional wider brackets for use with a 23-inch rack.

The following information can help you plan your equipment rack configuration:

- Allow clearance around the rack for maintenance.

- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat generated by equipment at the bottom of the rack can be drawn upward into the intake ports of the equipment above it.

- When mounting a chassis in an open rack, ensure that the rack frame does not block the intake or exhaust ports.

Router environmental requirements

The Cisco C8400 Series Secure Routers should be installed in a rack. The location of your router and the layout of your equipment rack or wiring room are extremely important considerations for proper operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdowns, and can make maintenance difficult. Plan for access to both front and rear panels of the router.

When planning your site layout and equipment locations, refer to the General Site Requirements section. If you are currently experiencing shutdowns or an unusually high number of errors with your existing equipment, these precautions and recommendations may help you to isolate the cause of failure and prevent future problems.

- Ensure that the room where your router operates has adequate air circulation. Electrical equipment generates heat. Without adequate air circulation, ambient air temperature may not cool equipment to acceptable operating temperatures.

- Always follow the ESD-prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

- Ensure that the chassis cover and module rear panels are secure. All empty network module slots, interface card slots, and power supply bays must have filler panels installed. The chassis is designed to allow cooling air to flow within it, through specially designed cooling slots. A chassis with uncovered openings permits air leaks, which may interrupt and reduce the flow of air across internal components.

- Baffles can help to isolate exhaust air from intake air. Baffles also help to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack. You can find the best placement by experimenting with different configurations.

- If equipment installed in a rack (particularly in an enclosed rack) fails, try operating the equipment individually. Power off other equipment in the rack (and in adjacent racks) to allow the router under test maximum cooling air and clean power.

Power guidelines and requirements

Check the power at your site to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

The Cisco C8400 Secure Routers have specific power and electrical wiring requirements. Adhering to these requirements ensures reliable operation of the system. Follow these precautions and recommendations when planning your site for the Cisco Cisco C8400 Secure Routers :

- The Cisco C8400 Secure Routers are always provided with a second support dual, identical power supplies to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.

- For power redundancy, each of the two power supplies should be connectedto a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.

- To prevent a loss of input power, be sure the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.

- Provide proper grounding to avoid personal injury and damage to the equipment due to lightning striking power lines or due to power surges. The chassis ground must be attached to a central office or other interior ground system.

For additional information, please refer to the Cisco C8400 Secure Routers datasheet.

The Cisco C8400 Secure Routers can be powered by a DC or AC source. Ensure that equipment grounding is present and observe power-strip ratings. Make sure that the total ampere rating of all the products plugged into the power strip does not exceed 80 percent of the rating.

For more information on the power supply system rating requirements for the Cisco C8400 Secure Routers, see *Power Supply* section.

Console port considerations

This device includes an asynchronous serial console port. You access to the device locally using a console terminal connected to the console port. This section discusses important cabling information that you must consider before connecting the device to a console terminal.

The Cisco 8400 Series Secure Routers provides one console port to connect a terminal or computer for local console access.

The console port has a RJ-45 connector, supports RJ-232 asynchronous data, and has distance recommendations specified in the IEEE RS-232 standard.

EIA/TIA-232

Depending on the cable and the adapter used, this port appears as a DTE or DCE device at the end of the cable.

The default parameters for the console port are 9600 baud, 8 data bits, 1 stop bit, and no parity. The console port does not support hardware flow control.

USB serial console port

The Micro-USB type B serial port can be used as an alternative to the RJ-45 console port. For Windows operating systems earlier than Windows 7, you must install a Windows USB device driver before using the USB console port.

Ethernet connections

The IEEE has established the Ethernet IEEE 802.3 Standards. The routers support the following ethernet implementations:

- 1000BASE-T—1000 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).

- 100BASE-T—100 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).

- 10BASE-T—10 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).

Required tools and equipment for installation and maintenance

You need the following tools and equipment to install and upgrade the router and its components:

- ESD-preventive cord and wrist strap

- Number 2 Phillips screwdriver

- Phillips screwdrivers: small, 3/16-in. (4 to 5 mm) and medium, 1/4-in. (6 to 7 mm)

    - To install or remove modules

    - To remove the cover, if you are upgrading memory or other components

- Screws that fit your rack

- Wire crimper

- Wire for connecting the chassis to an earth ground:

    - AWG 6 (13 mm 2) wire for NEBS-compliant chassis grounding

    - AWG 14 (2 mm 2) or larger wire for NEC-compliant chassis grounding

    - AWG 18 (1 mm 2) or larger wire for EN/IEC 60950-compliant chassis grounding

- For NEC-compliant grounding, an appropriate user-supplied ring terminal, with an inner diameter of 1/4 in. (5 to 7 mm)

In addition, depending on the type of modules you plan to use, you might need the following equipment to connect a port to an external network:

- Cables for connection to the WAN and LAN ports (dependent on configuration)

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| Note | For more information on cable specifications, see the Cisco Modular Access Router Cable Specifications document at cisco.com. |

- Ethernet hub or PC with a network interface card for connection to an Ethernet (LAN) port.

- Console terminal (an ASCII terminal or a PC running HyperTerminal or similar terminal emulation software) configured for 9600 baud, 8 data bits, 1 stop bit, no flow control, and no parity.

- Modem for connection to the auxiliary port for remote administrative access (optional).

- Data service unit (DSU) or channel service unit/data service unit (CSU/DSU) as appropriate for serial interfaces.

- External CSU for any CT1/PRI modules without a built-in CSU.