Preparing the Site

- Temperature Requirements, page 1
- Humidity Requirements, page 1
- Altitude Requirements, page 2
- Dust and Particulate Requirements, page 2
- Minimizing Electromagnetic and Radio Frequency Interference, page 2
- Shock and Vibration Requirements, page 3
- Grounding Requirements, page 3
- Planning for Power Requirements, page 3
- Airflow Requirements, page 4
- Rack and Cabinet Requirements, page 5
- Clearance Requirements, page 6

Temperature Requirements

The switch requires a operating temperature of 32 to 104° F (0 to 40° C). If the switch is not operating, the temperature must be between –40 to 158° F (–40 to 70° C).

Humidity Requirements

High humidity can cause moisture to enter the switch. Moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. The switch is rated to operate at 8 to 80 percent relative humidity, with a humidity gradation of 10 percent per hour. For nonoperating conditions, the switch can withstand from 5 to 95 percent relative humidity. Buildings in which the climate is controlled by air-conditioning in the warmer months and by heat during the colder months usually maintain an acceptable level of humidity for the switch equipment. However, if the switch is located in an unusually humid location, you should use a dehumidifier to maintain the humidity within an acceptable range.

Altitude Requirements

If you operate a switch at a high altitude (low pressure), the efficiency of forced and convection cooling is reduced and can result in electrical problems that are related to arcing and corona effects. This condition can also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or to perform at a reduced efficiency. This switch is rated to operate at altitudes from –500 to 13,123 feet (–152 to 4,000 meters). You can store the switch at altitudes of –1,000 to 30,000 feet (–305 to 9,144 meters).

Dust and Particulate Requirements

Exhaust fans cool power supplies and system fans cool switches by drawing in air and exhausting air out through various openings in the chassis. However, fans also ingest dust and other particles, causing contaminant buildup in the switch and increased internal chassis temperature. A clean operating environment can greatly reduce the negative effects of dust and other particles, which act as insulators and interfere with the mechanical components in the switch.

In addition to regular cleaning, follow these precautions to avoid contamination of your switch:

- Do not permit smoking near the switch.
- Do not permit food or drink near the switch.

Minimizing Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) from the switch can adversely affect other devices such as radio and television (TV) receivers operating near the switch. Radio frequencies that emanate from the switch can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on the switch monitor.

RFI is defined as any EMI with a frequency above 10 kHz. This type of interference can travel from the switch to other devices through the power cable and power source or through the air like transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of EMI and RFI that can be emitted by computing equipment. Each switch meets these FCC regulations.

To reduce the possibility of EMI and RFI, follow these guidelines:

- Cover all open expansion slots with a blank filler plate.
- Always use shielded cables with metal connector shells for attaching peripherals to the switch.

When wires are run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires with the following implications:

- Bad wiring can result in radio interference emanating from the plant wiring.
- Strong EMI, especially when it is caused by lightning or radio transmitters, can destroy the signal drivers and receivers in the chassis and even create an electrical hazard by conducting power surges through lines into equipment.

Note To predict and prevent strong EMI, you might need to consult experts in radio frequency interference (RFI).

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

Caution If the wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic switches. You might want to consult experts in electrical surge suppression and shielding if you had similar problems in the past.

Shock and Vibration Requirements

The switch has been shock- and vibration-tested for operating ranges, handling, and earthquake standards.

Grounding Requirements

The switch is sensitive to variations in voltage supplied by the power sources. Overvoltage, undervoltage, and transients (or spikes) can erase data from the memory or cause components to fail. To protect against these types of problems, ensure that there is an earth-ground connection for the switch. You can connect the grounding pad on the switch either directly to the earth-ground connection or to a fully bonded and grounded rack.

You must provide the grounding cable to make this connection, but you can connect the grounding wire to the switch using a grounding lug that ships with the switch. Size the grounding wire to meet local and national installation requirements. Depending on the power supply and system, a 12 AWG to 6 AWG copper conductor is required for U.S. installations (for those installations, we recommend that you use commercially available 6 AWG wire). The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.

Note You automatically ground the AC power supplies when you connect them to a power source. If you are using DC power supplies, you wire them to the facility earth ground. You must also connect the chassis to the facility earth ground.

Planning for Power Requirements

The switch includes two power supplies (1-to-1 redundancy with current sharing) in one of the following combinations:

- Two 650-W AC power supplies

- Two 930-W DC power supplies
- One 650-W AC power supply and one 930-W DC power supply

Note For power-supply redundancy, you must provide power to both power supplies. For grid redundancy, you must provide power to both power supplies and each power supply must be connected to a different power source.

The AC power supply is rated to output up to 650 W to the switch and the DC power supply is rated to output up to 930 W to the switch, but the switch requires less than those amounts of power from the power supply. To operate the switch you must provision enough power from the power source to cover the requirements of both the switch and a power supply. Typically, this switch and a power supply require about 374.5 W of power input from the power source, but you must provision as much as 694 W power input from the power source to cover peak demand.

To minimize the possibility of circuit failure, make sure that each power-source circuit used by the switch is dedicated to the switch.

Note For the AC power cables that you can use with this switch, see Power Cord Specifications. For DC power cables, the recommended wire gauge is 8 AWG and the minimum wire gauge is 10 AWG.

Airflow Requirements

The switch is designed to be positioned with its ports in either the front or the rear of the rack depending on your cabling and maintenance requirements. Depending on which side of the switch faces the cold aisle, you must have fan and power supply modules that move the coolant air from the cold aisle to the hot aisle in one of the following ways:

- Port-side exhaust airflow—Coolant air enters the chassis through the fan and power supply modules in the cold aisle and exhausts through the port end of the chassis in the hot aisle.
- Port-side intake airflow—Coolant air enters the chassis through the port end in the cold aisle and exhausts through the fan and power supply modules in the hot aisle.

You can identify the airflow direction of each fan and power supply module as follows:

- Fan and AC power supply modules:
  - Blue coloring for port-side exhaust airflow
  - Burgundy coloring for port-side intake airflow
- DC power supply modules have port-side intake airflow and green colored release levers

Note To prevent the switch from overheating and shutting down, you must position the air intake for the switch in a cold aisle, and all of the fan and power supply modules must have the same direction of airflow.

Rack and Cabinet Requirements

You can install the following types of racks or cabinets for your switch:

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom to top cooling)
- Standard open four-post Telco racks

To correctly install the switch in a cabinet that is located in a hot-aisle/cold-aisle environment, you should fit the cabinet with baffles to prevent exhaust air from recirculating into the chassis air intake.

Work with your cabinet vendors to determine which of their cabinets meet the following requirements or see the Cisco Technical Assistance Center (TAC) for recommendations:

- Use a standard 19-inch (48.3 cm), four-post Electronic Industries Alliance (EIA) cabinet or rack with mounting rails that conform to English universal hole spacing per section 1 of the ANSI/EIA-310-D-1992 standard.
- The depth of a four-post rack must be 24 to 32 inches (61.0 to 81.3 cm) between the front and rear mounting brackets.
- Required clearances between the chassis and the edges of its rack or the interior of its cabinet are as follows:
  - 4.5 inches (11.4 cm) between the front of the chassis and the interior of the cabinet (required for cabling).
  - 3.0 inches (7.6 cm) between the rear of the chassis and the interior of the cabinet (required for airflow in the cabinet if used).
  - No clearance is required between the chassis and the sides of the rack or cabinet (no side airflow).

Additionally, you must have power receptacles located within reach of the power cords used with the switch. For the power cord specifications, see Power Cord Specifications.

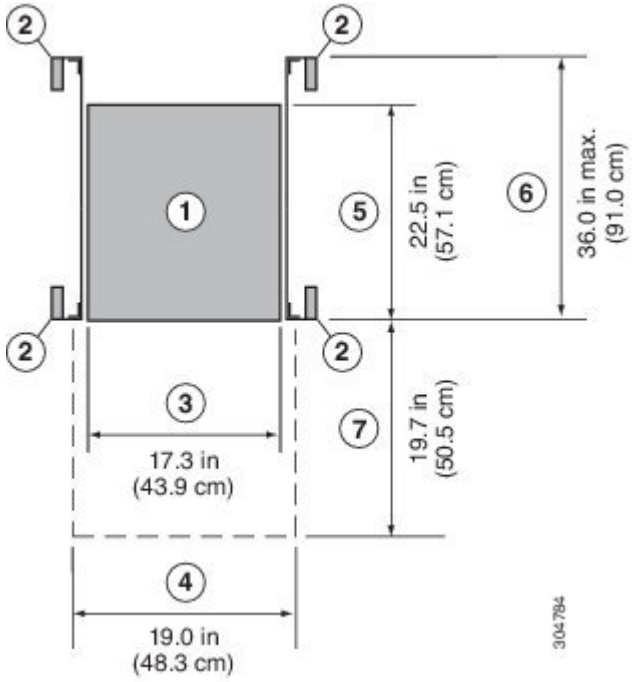
Warning **Statement 1048—**Rack Stabilization

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

Clearance Requirements

You must provide the chassis with adequate clearance between the chassis and any other rack, device, or structure so that you can properly install the chassis, route cables, provide airflow, and maintain the switch. For the clearances required for an installation of this chassis in a four-post rack, see the following figure.

Figure 1: Clearances Required for a Four-Post Rack Installation



1	Chassis	5	Depth of the chassis
2	Vertical rack-mount posts and rails	6	Maximum extension of the bottom-support rails
3	Chassis width	7	Depth of the front clearance area (this equals the depth of the chassis)
4	Width of the front clearance area (this equals the width of the chassis with two rack-mount brackets attached to it)		

Note Both the front and rear of the chassis must be open to both aisles for airflow.