Preparing the Site

This chapter describes the basic site requirements that you should be aware of as you prepare to install your Cisco Nexus 7000 Series switches.

This chapter includes the following sections:

Information About the Site Requirements

Environmental factors can adversely affect the performance and life span of your switch. The Cisco Nexus 7000 Series switches require a dry, clean, well-ventilated, and air-conditioned environment. To ensure normal operation, you must maintain ambient airflow. If the airflow is blocked or restricted, or if the intake air is too warm, an overtemperature condition can occur and the environmental monitor on the switch will shut down to protect the switch components.

In a 42-rack unit (RU) rack, you can maximize the number of Cisco Nexus 7000 Series switch models as follows:

- Six Cisco Nexus 7004 chassis
- Three Cisco Nexus 7009 chassis
- Two Cisco Nexus 7010 chassis
- One Cisco Nexus 7018 chassis

You must also allow enough room in front for loading the chassis using a mechanical lift and enough room in the rear for removing the switch components (this requirement in the rear applies only to the Cisco Nexus 7009, 7010, and 7018 chassis). When mounting the Cisco Nexus 7000 Series chassis in a

rack with other equipment, ensure that the exhaust from the other equipment does not blow into the air intake vent of the Cisco Nexus 7000 Series chassis. If your site has hot and cold aisles, align the rack or cabinet air intake to a cold aisle and exhaust to a hot aisle.

Temperature

Temperature extremes can cause the Cisco Nexus 7000 Series switches to operate at reduced efficiency and cause a variety of problems, including premature aging, failure of chips, and failure of switches. In addition, extreme temperature fluctuations can cause chips to become loose in their sockets. The Cisco Nexus 7000 Series switches should operate in an environment that is not colder than 32°F (0°C) or hotter than 104°F (40°C).

To control the switch temperature, you must make sure that the switch has adequate airflow, as follows:

- The Cisco Nexus 7004 switch requires side-to-back airflow, which requires that you leave at least 11 inches (27.9 cm) free on the right side of the chassis (as seen from the front side of the chassis, which shows all of the chassis modules). You must be sure that the cables do not block the airflow into the chassis on the right side (for more information, see the "Chassis Clearances" section on page B-22).
- The Cisco Nexus 7009 switch requires side-to-side airflow, which requires that you leave at least 11 inches (27.9 cm) free on both sides of the chassis (or 22 inches [55.8 cm] between two Cisco Nexus 7009 or 7018 switches]), and you must be sure that cables do not block the airflow from the lower right front of the chassis (for more information, see the "Chassis Clearances" section on page B-22).
- The Cisco Nexus 7010 switch requires front-to-back airflow, which requires that you do not block the front air intake or the rear exhaust areas (for more information, see the "Chassis Clearances" section on page B-22).
- The Cisco Nexus 7018 switch requires side-to-side airflow, which requires that you leave at least 11 inches (27.9 cm) free on both sides of the chassis (or 22 inches [55.8 cm] between two Cisco Nexus 7009 or 7018 switches]), and you must be sure that cables do not block the airflow from the lower right front of the chassis (for more information, see the "Chassis Clearances" section on page B-22).

To prevent overheating and to minimize the energy spent to cool the Cisco Nexus 7000 Series switch, do not place the chassis next to a heat source of any kind, including heating vents during cold weather.

Adequate ventilation is particularly important if you are operating a Cisco Nexus 7000 Series switch at high altitudes. Make sure that all slots and openings on the chassis remain unobstructed, especially the fan vents. Clean the installation site at regular intervals to avoid buildup of dust and debris, which can cause a switch to overheat.

If the Cisco Nexus 7000 Series switch is exposed to abnormally cold temperatures, allow a 2-hour warm-up period to bring it up to a normal operating temperature before you turn the switch on.

Caution If you do not allow a 2-hour warm-up period when temperatures are abnormally cold, you can damage the internal components.

Note The Cisco Nexus 7000 Series switches are equipped with internal air temperature sensors that trigger a minor alarm at 104°F (40°C) and a major alarm at 131°F (55°C).

Humidity

High humidity can cause moisture to seep into the Cisco Nexus 7000 Series switches. Moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. The Cisco Nexus 7000 Series is rated to operate at 8 to 80 percent relative humidity, with a humidity gradation of 10 percent per hour.

The Cisco Nexus 7000 Series switches can withstand from 5 to 90 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 a Cisco Nexus 7000 Series switch is located in an unusually humid location, you should use a dehumidifier to maintain the humidity within an acceptable range.

Altitude

If you operate a Cisco Nexus 7000 Series 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. The Cisco Nexus 7000 Series 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 Particles

Exhaust fans cool power supplies and system fan trays 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.

Note In the Cisco Nexus 7004 and 7010 switches, you can install an optional air filter in a nonclean environment.

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

- Do not permit smoking near the Cisco Nexus 7000 Series switch.
- Do not permit food or drink near the Cisco Nexus 7000 Series switch.

Corrosion

The corrosion of switch connectors is a gradual process that can eventually lead to intermittent failures of electrical circuits. The oil from your fingers or prolonged exposure to high temperature or humidity can corrode the gold-plated edge connectors and pin connectors on various components in the Cisco Nexus 7000 Series switches. To prevent corrosion, avoid touching contacts on modules and protect the switch from extreme temperatures and moist, salty environments.

Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) from the Cisco Nexus 7000 Series switch can adversely affect switches such as radio and television (TV) receivers operating near the switch. Radio frequencies that emanate from the Cisco Nexus 7000 Series 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 Cisco Nexus 7000 Series switch meets these FCC regulations.

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

- Cover all open expansion slots with a metal filler.
- 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 and cause 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.

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 may want to consult experts in electrical surge suppression and shielding if you had similar problems in the past.

Shock and Vibration

The Cisco Nexus 7000 Series switch has been shock- and vibration-tested for operating ranges, handling, and earthquake standards to Network Equipment Building Standards (NEBS) Zone 4 per GR-63-Core.

Grounding

The Cisco Nexus 7000 Series 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, you must properly ground the chassis and power supplies.

Note You can ground the AC power supplies and the 6-kW DC power supply, but you do not connect the 3-kW DC power supply directly to the data center earth ground. All chassis must be connected to the earth ground.

Power Source

You should use dedicated power circuits (rather than sharing circuits with other heavy electrical equipment). For power supply redundancy, we recommend that you use one redundant power supply that provides at least as much power as any of the other power supplies that provide the available power for operations. For input-source redundancy, we recommend that you use two dedicated power sources, each of which provides power to either half of each power supply unit (for the 6-kW and 7.5 kW power supplies) or half of the power supplies (for the 3-kW power supplies).

For the required circuit ratings for each power supply, see Table 2-1.

Table 2-1 Circuit Requirements for Power Supplies

Power Supply		Number of Circuits	Requirement for Each Circuit
AC Power Supplies			
7.5-kW power supply	(N7K-AC-7.5KW-INT)	1 or 2	30 A at 220 VAC
	(N7K-AC-7.5KW-US)	1 or 2	30 A at 220 VAC
6-kW power supply	(N7K-AC-6.0KW)	1 or 2	20 A at 110 VAC or 220 VAC
3-kW power supply	(N7K-AC-3.0KW)	1	20 A at 110 VAC or 220 VAC
DC Power Supplies			
6-kW power supply	(N7K-DC-6.0KW)	1 or 2	40 A at 48 V or –48 V
3-kW power supply	(N7K-DC-3.0KW)	1	20 A

The receptacles for AC circuits must be within 12 feet (3.6 m) of each power supply when the power supply is installed in the switch chassis. The 6-kW DC power supply connection must be within 15 feet (4.6 m) or you must install a DC power interface unit (PIU) within that distance to connect to a distant power supply connection. The 3-kW DC power supply connection must be within the distance covered by the power cord that you supply. If you are installing a DC PIU, you should install it in the same rack that holds the DC power supplies.

Before you connect the power supplies to the AC or DC power, you must install the power supplies in the Cisco Nexus 7000 Series chassis.