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Cisco Nexus 7000 Series Site Preparation Guide

June 23, 2008

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Text Part Number: OL-15846-01

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Cisco Nexus 7000 System Site Preparation Guide

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Preface

This preface describes the audience, organization, and conventions of the Cisco Nexus 7000 Series Site Preparation Guide. It also provides information on how to obtain related documentation.

Audience

This guide is intended for anyone who plans the facilities, including space, floor weighting, power, cooling, cabling, delivery, and storage, for the installation of the Cisco Nexus 7000 Series 10-slot chassis.

Document Organization

This document is organized into the following chapters:

Chapter	Description
Chapter 1, “Overview”	Provides an overview of the Nexus 7010 system.
Chapter 2, “Preparing the Site”	Describes the basic site requirements for installing the Nexus 7010 system.
Chapter 3, “Technical Specifications”	Describes the technical specifications for the Nexus 7010 system.
Chapter A, “Site Preparation and Maintenance Records”	Provides a site planning list to prepare your site for the Nexus 7010 system.
Chapter B, “Cabinet and Rack Requirements”	Describes the cabinet and rack requirements for the Nexus 7010 system.

Document Conventions

Notes use the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation

Cisco Nexus 7000 Series documentation is available at the following URL:

http://www.cisco.com/en/US/products/ps9402/tsd_products_support_series_home.html

The documentation set for the Cisco Nexus 7000 Series includes the following documents:

Release Notes

Cisco NX-OS Release Notes, Release 4.0

Cisco Nexus 7000 Series FPGA/EPLD Upgrade Release Notes, Release 4.0

Hardware Documents

Cisco Nexus 7000 Series Site Preparation Guide

Cisco Nexus 7000 Series Hardware Installation and Reference Guide

Cisco Nexus 7000 Series Regulatory Compliance and Safety Information

Cisco Nexus 7000 Series Connectivity Management Processor Configuration Guide

Software Documents

The Cisco Nexus 7000 Series ships with the Cisco NX-OS software. You can find software documentation for Cisco NX-OS at the following URL:

http://www.cisco.com/en/US/products/ps9372/tsd_products_support_series_home.html

The Cisco Datacenter Network Manager (DCNM) supports the Cisco Nexus 7000 Series. You can find documentation for DCNM at the following URL:

http://www.cisco.com/en/US/products/ps9369/tsd_products_support_series_home.html

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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CHAPTER 1

Overview

The Cisco Nexus 7000 Series devices support end-to-end data center connectivity, consolidating IP, storage, and interprocess communication (IPC) networks onto a single Ethernet fabric. The Cisco Nexus 7000 Series features a 10-slot chassis that provides front-to-back airflow and an integrated cable management system that facilitates device installation, operation, and cooling in both new and existing data centers. This chapter provides an overview of the Nexus 7010 system features.

The Nexus 7000 Series has a 10-slot chassis that can support a maximum of two supervisor modules and up to eight I/O modules.

Table 1-1 describes the features of the Nexus 7010 system.

Table 1-1 Nexus 7010 System Features

Feature	Description [1]
Chassis	10-slot chassis for holding supervisor and I/O modules, system and fabric fan trays, fabric modules, and power supplies.
Supervisor Modules	1–2—shipped in the chassis.
I/O Modules	0–8—shipped in the chassis.
System Fan Tray	2—shipped in the chassis.
Fabric Fan Tray	2—shipped in the chassis.
Fabric Modules	3–5—shipped in the chassis.
Power Supplies	2–3—shipped with the chassis but boxed separately.

1. The quantity of modules and fan trays shipped with the chassis will vary depending on your order.

For information about preparing your site for the Nexus 7000 Series devices, see Chapter 2, “Preparing the Site.”

For information about installing the Nexus 7000 Series devices, see the *Cisco Nexus 7000 Series Hardware Installation and Reference Guide*. For translations of the warnings in that guide, see the *Cisco Nexus 7000 Series Regulatory Compliance and Safety Information* document.

CHAPTER 2

Preparing the Site

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

This chapter includes the following sections:

About the Nexus 7000 Series

Environmental factors can adversely affect the performance and longevity of your system. The Nexus 7000 Series devices 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 and or if the intake air is too warm, an overtemperature condition can occur and the environmental monitor on the system will shut down to protect the system components.

You can mount up to two chassis in a rack with little or no clearance above and below the chassis. You must, however, have enough room in front for loading the chassis using a mechanical lift and enough room in the rear for removing the system components. When mounting the chassis in a rack with other equipment, ensure that the exhaust from other equipment does not blow into the air intake vent of the chassis. If your site has warm and cold aisles, align the rack or cabinet air intake to a cold aisle and exhaust to a warm aisle.

Temperature

When you install the Nexus 7000 Series, make sure that the system has adequate airflow from front to back and do not block the air inlet or the air exhaust.

Temperature extremes can cause the Nexus 7000 Series devices to operate at reduced efficiency and cause a variety of problems, including premature aging and failure of chips, and failure of devices. Extreme temperature fluctuations can cause chips to become loose in their sockets. The Nexus 7000 Series devices should be operating in an environment that is not colder than 41°F (5°C) or hotter than 104°F (40°C).

Make sure that the chassis has adequate ventilation; do not place the chassis next to a heat source of any kind, including heating vents during winter.

Adequate ventilation is particularly important at high altitudes. Make sure that all slots and openings on the system remain unobstructed, especially the fan vents on the chassis. Clean the installation site at regular intervals to avoid buildup of dust and debris, which can cause a system to overheat. If the Nexus 7000 series was 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 system on. Otherwise, you can damage the internal components.

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

The Nexus 7000 Series devices can withstand from 5 to 90 percent relative humidity when you store it. Buildings in which 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 system equipment. However, if a Nexus 7000 Series device is located in an unusually humid location, you can use a dehumidifier to maintain the humidity within an acceptable range.

Altitude

If you operate a Nexus 7000 Series device 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 Nexus 7000 Series is rated to operate at altitudes from –500 to 13,123 feet (–152 to 4,000 meters). You can store the system 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 systems 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 system 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 system.

Note You can use an optional air filter if you install a Nexus 7000 series device in a nonclean environment.

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

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

Corrosion

The corrosion of system 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 Nexus 7000 Series devices. To prevent corrosion, avoid touching contacts on modules and protect the system from extreme temperatures and moist, salty environments.

Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) from the Nexus 7000 Series can adversely affect devices such as radio and television (TV) receivers operating near the system. Radio frequencies that emanate from the Nexus 7000 Series device can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on the system monitor.

RFI is defined as any EMI with a frequency above 10 kHz. This type of interference can travel from the system 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 emitted by computing equipment. Each Nexus 7000 Series device 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 system.

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

Shock and Vibration

The Nexus 7000 Series 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 Nexus 7000 Series is sensitive to variations in voltage supplied by the AC-power source. 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 should always properly ground power cables.

Power Source

You should use a dedicated power circuit (rather than sharing a circuit with other heavy electrical equipment). We recommend that the Nexus 7000 Series have two separate AC-power sources. For each power supply, connect each of its AC-power cables to an independent power source.

Before you connect the power supplies to the AC power, you must install the power supplies in the Nexus 7010 chassis and you must have one 20A AC receptacle for each power cable that you need to connect to the Nexus 7010 power supplies. Each receptacle should be on a separate circuit and should be located on the rack within reach of the power cables when they are attached to the power supplies.

CHAPTER 3

Technical Specifications

This chapter describes the technical specifications for the Nexus 7010 system and includes these sections:

Environmental Specifications for the Nexus 7010 System

Table 3-1 lists the environmental specifications for the Nexus 7010 system.

Table 3-1 Environmental Specifications for the Nexus 7010 System

Description		Specification
Temperature	Ambient operating	41 to 104ºF (5 to 40ºC)
	Ambient nonoperating	–40 to 158ºF (–40 to 70ºC)
Relative humidity (RH)	Ambient (noncondensing) operating	5 to 90% (45 to 50% recommended)
	Ambient (noncondensing) nonoperating and storage	5 to 95%
Altitude	Operating	–500 to 13,123 feet (152 to 4,000 meters)
	Storage	–1,000 to 30,000 feet (–305 to 9,144 meters)
Noise	Sound pressure levels	
	Without air filter	67.2 dBA
	With air filter	70.2 dBA
	Sound power levels	
	Without air filter	78.9 dBA
	With air filter	81.7 dBA

Physical Specifications for the Nexus 7010 System

Table 3-2 lists the physical specifications for the Nexus 7010 system.

Table 3-2 Dimensions for the Nexus 7010 Chassis

Description	Width	Depth	Height[1]
Chassis	17.3 inches (43.9 cm)	38.0 inches (96.5 cm)	36.5 inches (92.7 cm) (21.0 RU)

1. The height includes the bottom support rail.

Table 3-3 lists the weights and quantities of the components that make up each Nexus 7010 system. These weights do not include the rack or cabinet that holds the Nexus 7010 system or the interface and power cables. For those weights, see the documentation provided by the manufacturers of those components.

Table 3-3 Weights, Quantities, and Mean Time Between Failure for the Nexus 7010 Chassis Components

Component	Weight per Unit	Quantity	MTBF[1] (hours) per Unit
Chassis	200 lbs. (90.9 kg)	1	264,649
Supervisor module	10 lbs. (4.5 kg)	2	79,725
48-port I/O module	14 lbs. (6.4 kg)	1 to 8 (mix of either or both types of I/O modules)	74,373
32-port I/O module with SFP+ transceivers	18.5 lbs. (8.4 kg)		33,652
Fabric module	4 lbs. (1.8 kg)	3 to 5	649,295
System fan tray	20 lbs. (9.1 kg)	2	264,649
Fabric fan tray	5 lbs. (2.3 kg)	2	264,649
Power supply	18 lbs. (8.2 kg)	2 to 3	204,415
Mid-frame doors and frame (optional)	N/A	0 or 1	N/A

1. The predicted mean time between failure (MTBF) is based on Bellcore Methodology.

Power Specifications for the Nexus 7010 System

The number of power supplies that your Nexus 7010 system requires depends on the numbers and types of modules that you include in the system chassis and the power redundancy mode that you are using.

The following topics explain how to calculate the system power requirements and the amount of power available for each type of power redundancy mode:

- Power Requirements, page 3-3
- Power Supply Configuration Modes, page 3-3

Power Requirements

To determine the power requirements of the Nexus 7000 System, add the power requirements of each of its components.

The quantity of each type of module in your system depends on how you configure your system. You can configure your system according to the following minimum and maximum guidelines:

- (Minimum) 1 supervisor module, 1 I/O module, 3 fabric modules, 2 power supplies
- (Maximum) 2 supervisor modules, 8 I/O modules, 5 fabric modules, 3 power supplies

Table 3-4 lists the power requirements for each type of module that can be included with the the Nexus 7010 system.

Table 3-4 Power requirements for the Nexus 7010 system

Component	Maximum	Typical
Supervisor module	200 watts	190 watts
48-port I/O module	400 watts	358 watts
32-port I/O module	750 watts	611 watts
Fabric module	60 watts	55 watts
All fan trays (total)	2184 watts	300 watts
Power supply	300 watts	200 watts

Power Supply Configuration Modes

You can configure one of the following power modes to either utilize all of the available power provided by the installed power supplies or to provide power redundancy when there is a power loss:

- Combined mode—This mode provides the maximum amount of available power by utilizing the combined power output from all installed power supplies for system operations. This mode does not provide a redundancy.
- Power-supply redundancy mode—This mode lets you replace a power supply during system operations. All power supplies are active but the available power is calculated as the least amount of power available from all but one of the power supplies (N+1) and the reserve power is the amount of power output by the power supply that can output the most power. For example, if three power supplies output 3.0 kW, 6.0 kW, and 6.0 kW, the available power is 9.0 kW (3.0 kW + 6.0 kW) and the reserve power is 6.0 kW.
- Input source redundancy mode—This mode takes power from two electrical grids so that if one grid goes down, the other grid can provide the power needed by the system. Each grid powers half of each power supply (grid A is connected to the Input 1 receptacle on each power supply and grid B is connected to the Input 2 receptacle on each power supply). The available power is calculated as the amount of power output by the portions of power supplies connected to the same grid. For example, if three power supplies are connected to a 110V grid and a 220V grid, each power supply outputs 1.2 kW for the 110V grid and 3.0 kW for the 220V grid. The available power would be 3.6 kW (1.2 kW + 1.2 kW + 1.2 kW) and the reserve power would be 9.0 kW (3.0 kW + 3.0 kW + 3.0 kW).

- Full redundancy mode—This mode provides both power-supply redundancy and input-source redundancy. This mode lets you replace a power supply without interrupting system operations, and it lets you continue powering the system if one of two grids goes down. The available power is calculated as the lesser amount of output power for power supply redundancy or input source redundancy.

Table 3-5 shows the amount of power that each power mode makes available for your Nexus 7000 system depending on the hardware installed in your system, the amount of power input to the power supplies, the voltage used for the input power, and the power mode you are using.

Table 3-5 Power Availability for Each Power Mode Configuration and Power Supply Installation

	Combined mode	Power supply redundancy mode	Input source redundancy mode	Full redundancy mode
Dual inputs per power supply unit				
220 V and 220 V inputs				
1 power supply	6,000 W	-	3,000 W	-
2 power supplies	12,000 W	6,000 W	6,000 W	6,000 W
3 power supplies	18,000 W	12,000 W	9,000 W	9,000 W
220 V and 110 V inputs				
1 power supply	4,200 W	-	1,200 W	-
2 power supplies	8,400 W	4,200 W	2,400 W	2,400 W
3 power supplies	12,600 W	8,400 W	3,600 W	3,600 W
110 V and 110 V inputs				
1 power supply	2,400 W	-	1,200 W	-
2 power supplies	4,800 W	2,400 W	2,400 W	2,400 W
3 power supplies	7,200 W	4,800 W	3,600 W	3,600 W
Single inputs per power supply unit				
220 V input				
1 power supply	3,000 W	-	-	-
2 power supplies	6,000 W	3,000 W	-	-
3 power supplies	9,000 W	6,000 W	-	-
110 V input				
1 power supply	1,200 W	-	-	-
2 power supplies	2,400 W	1,200 W	-	-
3 power supplies	3,600 W	2,400 W	-	-

System Clearances

You must provide adequate clearance for installing the system and replacing system modules. The aisle in front of the system must have at least 38.0 inches of clearance to handle the depth of the system (additional clearance might be necessary for the mechanical lift used to position the chassis in front of the rack). The aisle in back of the system must provide at least 30 inches of clearance for replacing the system fan trays.

Facility Cooling Requirements

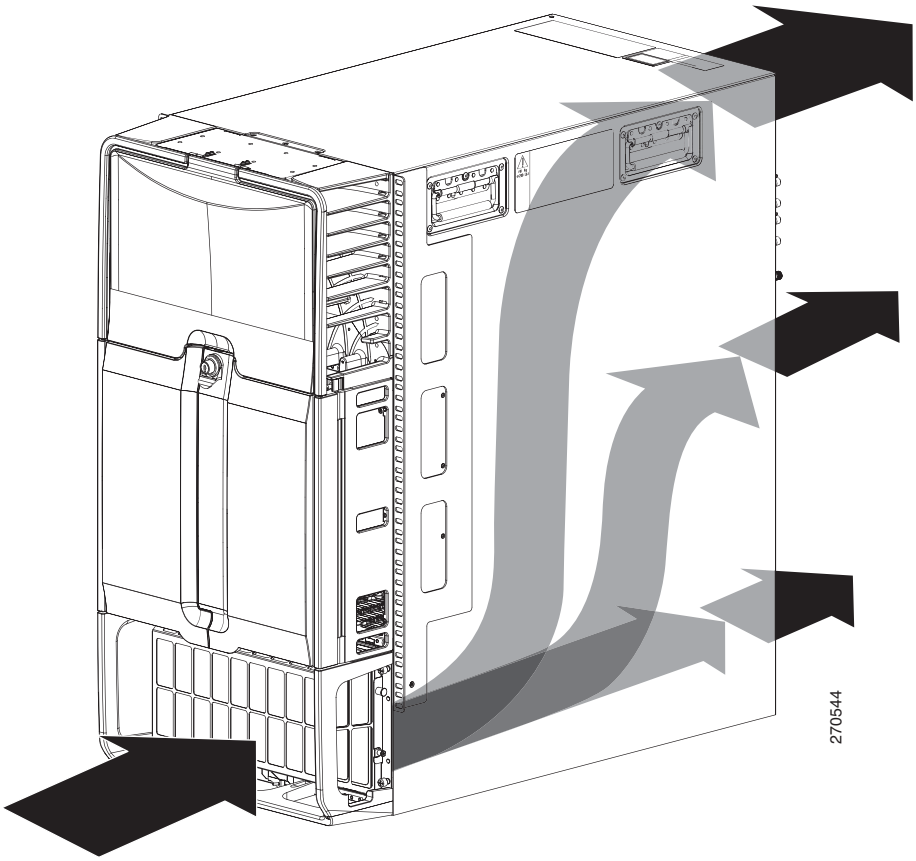
The Nexus 7000 Series 10-slot chassis dissipates considerable power that generates much heat. The following is the heat dissipation requirement for the 10-slot chassis:

- 26,562 BTUs per hour

Chassis Airflow

The Nexus 7000 Series 10-slot chassis has a set of fan trays that are used to cool the rest of the chassis modules. Cool air flows in at the bottom front of the chassis and flows through the chassis and through the fans in the fan trays before being exhausted at the top rear of the chassis (see Figure 3-1).

Figure 3-1 Airflow Through the 10-Slot Chassis



APPENDIX A

Site Preparation and Maintenance Records

This appendix provides a site planning list that you can use when preparing your site for the Nexus 7000 series devices and includes these sections:

Site Preparation Checklist

Planning the location and layout of your equipment rack or cabinet is essential for successful device operation, ventilation, and accessibility.

Table A-1 lists the site planning tasks that we recommend that you complete before you install the Nexus 7000 series. Your completion of each task ensures a successful device installation.

Table A-1 Site Planning Checklist

Planning Activity	Verification Time and Date
Space evaluation: • Space and layout • Floor covering • Impact and vibration • Lighting • Physical access • Maintenance access	
Environmental evaluation: • Ambient temperature • Humidity • Altitude • Atmospheric contamination • Airflow	

Table A-1 Site Planning Checklist (continued)

Planning Activity	Verification Time and Date
Power evaluation: • Input power type • Power receptacles • Receptacle proximity to the equipment • Dedicated (separate) circuits for power redundancy • UPS for power failures • Grounding: proper gauge wire and lugs • Circuit breaker size	
Grounding evaluation: • Data center ground	
Cable and interface equipment evaluation: • Cable type • Connector type • Cable distance limitations • Interface equipment (transceivers)	
EMI evaluation: • Distance limitations for signaling • Site wiring • RFI levels	

Contact and Site Information

Use the following worksheet (Table A-2) to record contact and site information.

Table A-2 Contact and Site Information

Contact person	
Contact phone	
Contact e-mail	
Building/site name	
Data center location	
Floor location	
Address (line 1)	
Address (line 2)	
City	
State	
ZIP code	
Country	

Chassis and Module Information

Use the following worksheets (Table A-3 and Table A-4) to record information about the chassis and modules.

Contract Number

Chassis serial number

Product number

Table A-3 Network-Related Information

Device IP address	
Device IP netmask	
Hostname	
Domain name	
IP broadcast address	
Gateway/router address	
DNS address	

Table A-4 Module Information

Slot	Module Type	Module Serial Number	Notes
1			
2			
3			
4			
5	Supervisor		
6	Supervisor		
7			
8			
9			
10			

APPENDIX B

Cabinet and Rack Requirements

This appendix describes the cabinet and rack requirements and includes these sections:

General Requirements for Cabinets and Racks

This section provides the Nexus 7000 Series requirements for the following types of racks and cabinets, assuming an external ambient air temperature range of 41 to 104°F (5 to 40°C):

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

Note If you select an enclosed cabinet, we recommend that you use one of the following thermally validated types: standard perforated or solid-walled with a fan tray.

To correctly install the Nexus 7000 Series in a hot-aisle cold-aisle environment, you should fit a cabinet with baffles to prevent exhaust air from recirculating.

Note The verified cabinet vendors for the Nexus 7000 Series are Panduit and Chatsworth.

The rack or cabinet used to hold a Nexus 7000 Series should meet the following requirements:

- Use a standard 19-inch, 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.
- Have at least 21 rack units (RU) of usable vertical rack space for one Nexus 7000 series device and 42 RU for two Nexus 7000 Series devices (45 RU is recommended).

Each of the following optional requirements are site specific:

- Accommodate up to two Nexus 7000 10-slot chassis and provide cable management for up to 384 ports for each Nexus 7000 series device.
- Provide the features required for the AC power distribution units (PDUs) for the power supplies installed in each chassis.

- Have the capacity to accommodate cable routing within the cabinet without blocking access to any of the pluggable modules installed in a chassis, and without blocking any airflow on the inlet and exhaust vents of the chassis. The cables should be able to be routed out the top or bottom of the cabinet.
- Where necessary, have a Seismic rating of Network Equipment Building Standards (NEBS) Zone 3 or Zone 4, per GR-63-CORE if required.
- Have a minimum gross load rating of 2000 lbs. (907.2 kg) (static load rating) if supporting two devices.

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