



CHAPTER 2

Preparing for Installation

Before installing your Cisco 7200 VXR router, you should consider the power and cabling requirements that must be in place at your installation site, the equipment you need to install the router, and the environmental conditions your installation site must meet to maintain normal operation. This chapter guides you through the process of preparing for your router installation.

The chapter contains the following sections:

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Warning

Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for Cisco 7200 Series Routers* publication. This document provides important safety information you should know before working with the system. Statement 200

Tools and Parts Required

Your Cisco 7200 VXR chassis is fully assembled at the factory; no assembly is required. However, you need the following tools and equipment to install the chassis and the rack-mount and cable-management kit:

- Number 2 Phillips screwdriver
- A 3/16-inch flat-blade screwdriver
- A 1/4-inch flat-blade screwdriver
- Tape measure (optional)
- Level (optional)

The rack-mount and cable-management kit includes the following parts:

- Two rack-mount brackets for mounting the chassis in the rack

- Four M4 x 8-mm Phillips flathead screws to secure the rack-mount brackets to the chassis
- Six 10-32 x 3/8-inch slotted binderhead screws to secure the rack-mount brackets to the rack rails
- Two cable-management brackets to relieve the strain on installed port adapter interface cables
- Four M4 x 8-mm Phillips flathead screws to secure the cable-management brackets to the chassis or the rack-mount brackets
- Two cable-management brackets for the NPE-G1 or NPE-G2

In addition, you might need the following external equipment:

- One optical cable-management bracket for the NPE-G1 or NPE-G2
- One RJ-45 cable to connect to the Fast Ethernet Management Port on the NPE-G2
- Data service unit (DSU) to connect each serial port to an external network
- One serial port adapter cable for each serial port to connect the port with the remote device or network
- T1 channel service unit/data service unit (CSU/DSU) that converts the High-Level Data Link Control (HDLC) synchronous serial data stream into a T1 data stream with the correct framing and ones density to connect a serial port to a T1 network. (Some telephone systems require a minimum number of 1 bits per time unit in a data stream, called *ones density*.) Several T1 CSU/DSU devices are available as additional equipment, and most provide either a V.35, EIA/TIA-449, or EIA-530 electrical interface.
- Ethernet transceiver
- Token Ring multistation access unit (MSAU)

Electrical Equipment Guidelines

The port adapters and power supplies are designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system. However, you *must* power down the system before removing or replacing the I/O controller, Port Adapter Jacket Card, and network services engine (NSE) or network processing engine (NPE).



Caution

Always tighten the captive installation screws on the network processing engine or network services engine and I/O controller. These screws prevent accidental removal, provide proper grounding for the system, and help ensure that the bus connectors are properly seated in the midplane.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which occurs when electronic cards or components are improperly handled, can result in complete or intermittent system failures. The network processing engine or network services engine, I/O controller, and each port adapter consists of a printed circuit board that is fixed in a metal carrier. Electromagnetic interference (EMI) shielding, connectors, and a handle are integral components of the carrier. Although the carrier helps protect the boards, use an antistatic strap whenever handling the network processing engine or network services engine, I/O controller, and port adapters. Handle the carriers by the handle and the carrier edges only; never touch the boards or connector pins.

Site Requirement Guidelines

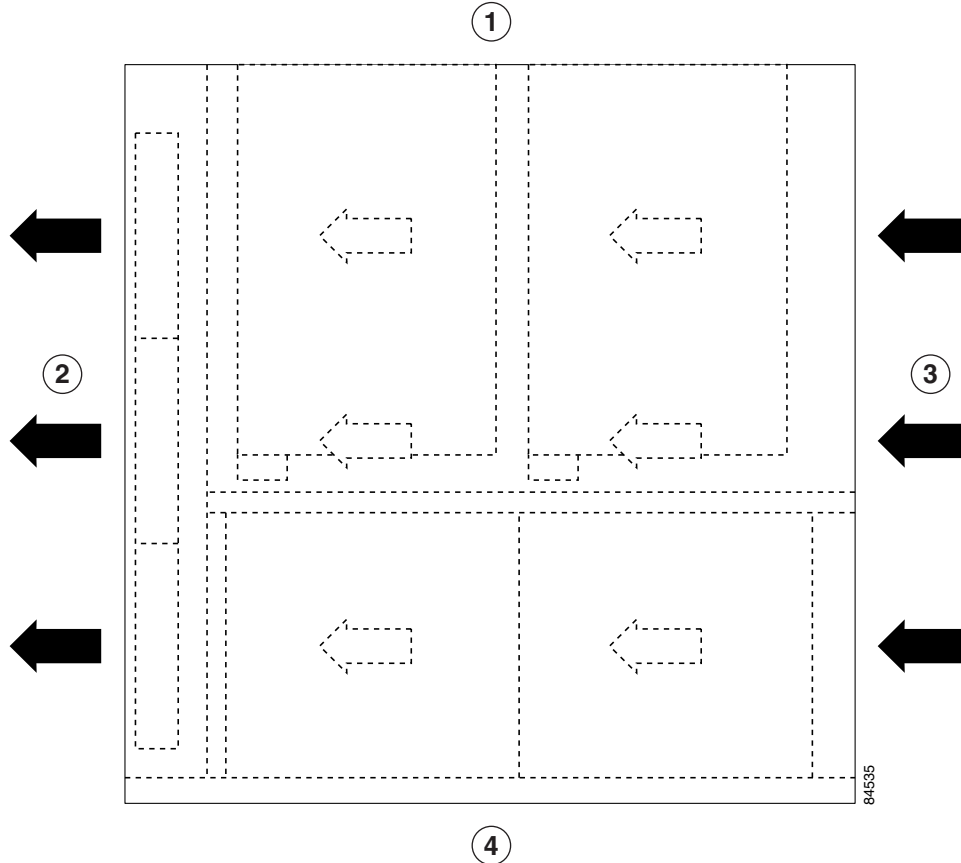
The environmental monitoring functionality in the Cisco 7200 VXR routers protects the system and components from potential damage from overvoltage and overtemperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site *before* installation. After installation, make sure the site maintains an ambient temperature of 32°F through 104°F (0°C through 40°C), and keep the area around the chassis as free from dust as is practical.

Planning a proper location for the Cisco 7200 VXR router and the layout of your equipment rack or wiring closet is essential for successful system operation. Equipment placed too close together or inadequately ventilated can cause system overtemperature conditions. In addition, chassis panels made inaccessible by poor equipment placement can make system maintenance difficult. Following are precautions that can help avoid problems during installation and ongoing operation.

When you plan the location and layout of your equipment rack or wiring closet, you need to consider how air flows through your router. The Cisco 7200 VXR routers draw cooling air in through the intake vent on the right side of the chassis (when you view the router from the front), and move the air across the internal components and out the exhaust vent on the left side of the chassis.

Temperature sensors on the network processing engine or network services engine and I/O controller monitor the internal air temperature and send warning messages when the internal air temperature approaches a specified threshold. If the internal temperature exceeds the specified threshold, the system environmental monitor shuts down all internal power to prevent equipment damage from excessive heat. (See the [“Environmental Monitoring and Reporting Functions”](#) section on page 1-59 for temperature threshold information.)

[Figure 2-1](#) shows the airflow through the router.

Figure 2-1 Internal Airflow—Top View

1	Chassis rear (power supply)	3	Inlet airflow
2	Exhaust air	4	Chassis front (port adapters)

The left and right sides of the chassis must remain unobstructed to ensure adequate air flow and prevent overheating inside the chassis; we recommend at least 3 in. (7.62 cm) of clearance.

Follow these general precautions when planning your equipment locations and connections:

- Use the **show environment** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings for high temperature and maximum and minimum voltages and creates reports on any occurrences. If warning messages are displayed, take immediate action to identify the cause and correct the problem.
- We recommend keeping Cisco 7200 VXR routers off the floor and out of any area that tends to collect dust.
- Follow ESD prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the network processing engine or network services engine, I/O controller, port adapters, any blank port adapters, Port Adapter Jacket Card, power supplies, and any power supply filler plates are in place and secure. The fans direct cooling air throughout the chassis interior; a loose component or empty slot can redirect the air flow away from active components.

The following sections address the site environment requirements for the Cisco 7200 VXR routers.

Rack-Mounting Guidelines

Before installing the Cisco 7200 VXR router in a rack, read the “Site Preparation and Safety” section of the *Regulatory Compliance and Safety Information for Cisco 7200 Series Routers* to familiarize yourself with proper site and environmental conditions. Failure to read and follow the guidelines could lead to an unsuccessful installation and possible damage to the router and components.

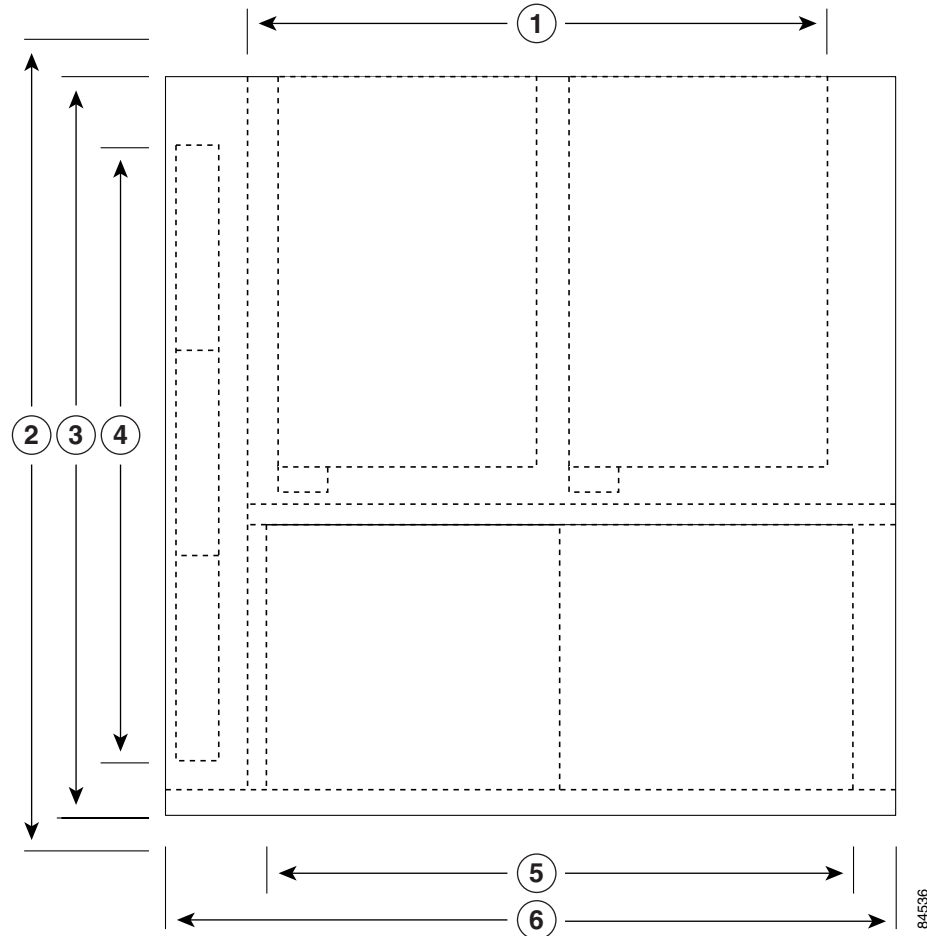
The rack-mounting hardware included with Cisco 7200 VXR routers is suitable for most 19-inch equipment racks and two-post racks. To easily access FRUs while the router is installed in a rack, make certain you have access to the front and rear of the router.

Before using a particular rack, check for obstructions (such as a power strip) that could impair rack-mount installation. If a power strip does impair a rear rack-mount installation, remove the power strip before installing a Cisco 7200 VXR router in the rack, and then replace it after the chassis is installed. As an alternative, you can mount a Cisco 7200 VXR router on an equipment shelf provided that the rack dimensions allow you to secure the router to the shelf, and the overall configuration permits safe installation and access. However, we recommend rack-mounting Cisco 7200 VXR routers.

[Figure 2-2](#) shows the Cisco 7200 VXR router footprint and outer dimensions.

To use the rack-mounting hardware provided with the Cisco 7200 VXR routers, consider the following guidelines:

- To mount the router between two posts or rails using the brackets, the inner clearance (the width between the *inner* sides of the two posts or rails) must be at least 17.00 inches (43.18 cm).
- The height of the chassis is 5.25 inches (13.34 cm).
- When mounting the router in either four-post or two-post racks, be sure to use all the screws and the brackets provided to secure the chassis to the rack posts.

Figure 2-2 Cisco 7200 VXR Router Footprint and Outer Dimensions

1	Network processing engine width 13.8 in. (35.05 cm)	4	Fan tray depth 15.81 in. (40.16 cm)
2	Chassis depth (including cable service loop and port adapter cables) 26 in. (66.04 cm)	5	Card cage and I/O controller width 13.5 in. (34.29 cm)
3	chassis depth 17.0 in. (43.18 cm)	6	Chassis width 16.8 in. (42.67 cm).

When planning your rack installation, consider the following guidelines:

- If you plan to use an equipment shelf, ensure that the shelf is constructed to support the weight and dimensions of the chassis. [Figure 2-2](#) shows the chassis footprint, which you need if you are designing a customized shelf. We recommend that you use the rack-mount kit designed for Cisco 7200 VXR routers.



Caution

To prevent chassis overheating, never install the Cisco 7200 VXR in an enclosed rack or room that is not properly ventilated or air-conditioned.

- Allow sufficient clearance around the rack for maintenance. If the rack is mobile, you can push it back near a wall or cabinet for normal operation and pull it out for maintenance (installing or moving port adapters, connecting cables, or replacing or upgrading components). Otherwise, allow 19 inches (48.3 cm) of clearance to remove Cisco 7200 VXR FRUs.
- If you are planning to install the cable-management brackets on a Cisco 7200 VXR router that you are rack-mounting from the front, you *must* install the cable-management brackets and the rack-mount brackets *before* you install the chassis in the rack.
- Provide an adequate chassis ground (earth) connection for your router chassis.



Note

We strongly recommend that you provide a chassis ground connection. See the [“Attaching a Chassis Ground Connection”](#) section on page 3-17 in [Chapter 3, “Installing a Cisco 7200 VXR Router”](#) for instructions.

To properly install a Cisco 7200 VXR chassis in a rack, see the instructions in the [“Rack-Mounting a Cisco 7200 VXR Router”](#) section on page 3-2 in [Chapter 3, “Installing a Cisco 7200 VXR Router.”](#)

Temperature and Humidity Requirements

[Table 2-1](#) lists the operating and nonoperating environmental site requirements. The ranges listed are those within which the Cisco 7200 VXR routers continue to operate; however, a measurement that is approaching the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental anomalies before they approach a maximum operating range.

Table 2-1 Specifications for Operating and Nonoperating Environments

Specification	Minimum	Maximum
Temperature, ambient operating	32°F (0°C)	104°F (40°C)
Temperature, ambient nonoperating and storage	–4°F (–20°C)	149°F (65°C)
Humidity, ambient (noncondensing) operating	10%	90%
Humidity, ambient (noncondensing) nonoperating and storage	5%	95%
Altitude, operating, and nonoperating	Sea level	6,500 ft. (2000 m)
Vibration, operating	5–200 Hz, 0.5 g (1 octet/min.)	—
Vibration, nonoperating	5–200 Hz, 1 g (1 octet/min.) 200–500 Hz, 2 g (1 octet/min.)	—

Power Connection Guidelines

Follow these precautions and recommendations when planning power connections to a Cisco 7200 VXR router:

- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.
- Install proper grounding to avoid damage from lightning and power surges.

**Note**

The Cisco 7200 VXR router installation must comply with all applicable codes and is approved for use with copper conductors only. The ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material.

Attachment of the chassis ground to a central office or other interior ground system should be made with a 6-AWG, copper ground conductor at a minimum.

The Cisco 7200 VXR chassis employs two threaded M5 chassis grounding receptacles, located on the rear of the chassis, which are intended to be bonded directly to the central offices or other interior ground system. The chassis ground requires M5 screws and locking hardware, which are not included. (For instructions on how to properly ground the chassis, see the [“Attaching a Chassis Ground Connection” section on page 3-17 in Chapter 3, “Installing a Cisco 7200 VXR Router.”](#))

Plant Wiring Guidelines

Following are guidelines for setting up the plant wiring and cabling at your site. When planning the location of the new system, consider the distance limitations for signaling, EMI, and connector compatibility, as described in the following sections.

Interference Considerations

When wires are run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires. This fact has two implications for the construction of plant wiring:

- Bad wiring practice 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 Cisco 7200 VXR routers, and can even create an electrical hazard by conducting power surges through lines and into equipment.

**Note**

To predict and remedy strong EMI, you may also need to consult experts in radio frequency interference (RFI).

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

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 load 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.

Distance Limitations and Interface Specifications

The size of your networks and the distances between connections depend on the type of signal, the signal speed, and the transmission media (the type of cabling used to transmit the signals). For example, standard coaxial cable has a greater channel capacity than twisted-pair cabling. The distance and rate limits in the following descriptions are the IEEE-recommended maximum speeds and distances for signaling; however, you can usually get good results at speeds and distances far greater than these. For example, the recommended maximum rate for V.35 is 2 Mbps, but it is commonly used at 4 Mbps without any problems. If you understand the electrical problems that might arise and can compensate for them, you should get good results with rates and distances greater than those shown here; however, do so at your own risk.



Note

We recommend that you do not exceed specified transmission rate and distance limits.

When preparing your site for network connections to a Cisco 7200 VXR router, you must consider a number of factors related to each type of interface:

- The type of cabling required for each type (fiber, thick or thin coaxial, shielded twisted-pair, or unshielded twisted-pair cabling)
- Distance limitations for each signal type
- The specific cables you need to connect each interface
- Any additional interface equipment you need, such as transceivers, hubs, switches, modems, channel service units (CSUs), or data service units (DSUs)
- Cable pinouts if you plan to build your cables

The specific interface information you need is contained in the documentation that is shipped with each port adapter. For example, if you need ATM distance limitations and pinouts, refer to the *PA-A3 Enhanced ATM Port Adapter Installation and Configuration* document. This document is online on Cisco.com and on the Documentation DVD.

Before installing a Cisco 7200 VXR router, have all additional external equipment and cables on hand. For ordering information, contact a customer service representative.

Initial Configuration Information

After you install the chassis and verify that all the hardware is operating properly, you must configure the system and individual interfaces before you can connect your system to external networks. You can use the setup facility or standard configuration commands to enter the configuration information.

Before you begin, you should be prepared with global (system-wide) parameters such as host names, passwords, and routing protocols, and configuration information for each interface such as addresses, rates or speeds of operation, routing protocol specifics, and so on.

Following is some of the information you are likely to need, depending on your configuration:

- Host name for the router
- Passwords to prevent unauthorized privileged-level access to the EXEC command interpreter and for individual virtual terminal lines
- Protocols you plan to route
- Bridging configuration (if you plan to use bridging and, if so, on which interfaces)
- Internet Protocol (IP) addresses and subnet masks if you are routing IP
- Zone names, network numbers, or node numbers for the new interfaces if required
- Operating speeds for specific interfaces—for example, Token Ring interfaces operate at either 4 or 16 Mbps, and serial interfaces operate at speeds of up to 2 Mbps. The speed of an interface often depends on the speed of the remote device to which it is attached.

For complete configuration instructions, refer to the *Configuration Fundamentals Configuration Guide* and the *Configuration Fundamentals Command Reference*, which are available on Cisco.com or on the Documentation DVD.

Cisco 7200 VXR Router Installation Checklist

To assist you with your installation and to provide a historical record of what was done by whom, use the Cisco 7200 VXR Router Installation Checklist in [Table 2-2 on page 2-11](#). Make a copy of this checklist and indicate when each procedure or verification is completed. When the checklist is completed, place it in your site log (described at the end of this chapter) along with the other records for your new router.

Table 2-2 Cisco 7200 VXR Router Installation Checklist

Task	Verified By	Date
Date router received		
Router and all accessories unpacked		
Types and numbers of interfaces verified		
Safety recommendations and guidelines reviewed		
Installation Checklist copied		
Site log established and background information entered		
Site power voltages verified		
Site environmental specifications verified		
Required passwords, IP addresses, device names, and so on, available		
Required tools available		
Network connection equipment available		
Router mounted in rack (optional)		
Cable-management brackets installed (optional but recommended)		
AC power cable(s) connected to AC source(s) and router; retention clip secured		
DC power cable(s) connected to DC source(s) and router		
Captive installation screws on I/O controller and network processing engine or network services engine checked		
Network interface cables and devices connected		
ASCII terminal attached to console port		
Console port set for 9600 baud, 8 data bits, no parity, and 2 stop bits (9600 8N2)		
System power turned on (DC OK LED is on)		
System boot complete (I/O controller enabled LED is on)		
I/O controller, network processing engine or network services engine, and all port adapters operational (enabled LEDs on the port adapters and the I/O controller are on)		
Correct hardware configuration displayed after system banner appears		
System ready for global and interface-specific configuration		

Checking the Shipping Container Contents

Once you receive your Cisco 7200 VXR router, use the following procedure to check the contents of the shipping container. Use the [Cisco 7200 VXR Component List](#) in [Table 2-3](#) to ensure you received all the components you ordered.

**Note**

Do not discard the shipping container. You need the container if you move or ship the Cisco 7200 VXR router in the future.

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- Step 1** Verify that the following are included in the shipping container (the accessories box might be separate):
- One Cisco 7200 VXR router, fully assembled (except the rack-mount and cable-management kit)
 - One or more accessories boxes (some or all may be shipped separately)
- Step 2** Check the contents of the accessories box against the [Cisco 7200 VXR Component List](#) and the packing slip to verify that you received all listed equipment, which should include the following:
- One modular power cable for each AC-input power supply
 - One rack-mount and cable-management kit (four brackets and 14 mounting screws)
 - Optional equipment that you ordered, such as network interface cables, transceivers, or special connectors
 - Cisco 7200 VXR router hardware and software documentation, if ordered

**Note**

We no longer ship the entire router documentation set automatically with each system. You must specifically order the documentation as part of the sales order. If you ordered documentation and did not receive it, we will ship the documents to you within 24 hours. To order documents, contact a customer service representative.

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- Step 3** Verify that the port adapters installed in your Cisco 7200 VXR router match the port adapter types on the packing list.
- Step 4** Proceed to the [“Site Log” section on page 2-13](#), and then to [Chapter 3, “Installing a Cisco 7200 VXR Router,”](#) to begin the installation.
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Table 2-3 Cisco 7200 VXR Component List

Component	Description	Received
Chassis	Cisco 7204VXR or Cisco 7206VXR chassis configured with a network processing engine or network services engine, I/O controller, up to two AC or DC power supplies, up to four port adapters for the 4-slot chassis or up to six port adapters for the 6-slot chassis (blank port adapters should be installed in empty port adapter slots), and up to two Flash Disks or PC cards or a CompactFlash Disk.	
Accessories:	The following accessories might arrive in separate shipping containers:	
• Rack-mount and cable-management kit ¹	Two rack-mount brackets, two cable-management brackets, eight M4 x 8-mm Phillips flathead screws, and six 10-32 x 3/8-inch slotted binderhead screws	
• Power cables	Up to two power cables	
• Documentation	If ordered, router hardware and software documentation set and the Cisco Documentation DVD package ²	

1. The NPE-G1 and the NPE-G2 ship with an additional set of cable-management brackets.

2. Titles and quantities of documents will vary. You must order the type and quantity of documentation sets when you order the hardware.

Site Log

A site log provides a historical record of all actions relevant to the Cisco 7200 VXR router operation and maintenance. Keep your site log in a common place near the chassis where anyone who performs tasks has access to it. Site log entries might include the following:

- Installation progress—Make a copy of the Cisco 7200 VXR Router Installation Checklist and insert it into the site log. Make entries on this checklist as each procedure is completed.
- Upgrades, removal, and replacement procedures—Use the site log as a record of system maintenance and expansion history. Each time a procedure is performed on the system, update the site log to reflect the following:
 - Port adapters installed, removed, and replaced
 - I/O controller removed and replaced
 - Network processing engine or network services engine removed and replaced
 - Power supply removed or replaced
 - Chassis replaced
 - Configuration changed; port adapters moved
 - Software upgraded
 - Corrective maintenance procedures performed
 - Intermittent problems
 - Related comments

Table 2-4 Site Log Sample

[illegible]