Preparing for Installation

This chapter provides specific information about preparing your site for the installation of the Cisco XR 12404 Router. Included in this chapter are:

Before installing the Cisco XR 12404 Router, you should consider the following:

- Power and cabling requirements that must be in place at your installation site
- Equipment you will need to install the router
- Environmental conditions your installation site must meet to maintain normal operation.

Note Do not unpack the router until you are ready to install it.

Tools and Equipment

The Cisco XR 12404 Router is designed to be installed with a minimum number of tools. The following tools are required.

- 1/4-inch flat-blade screwdriver
- 3/16-inch flat-blade screwdriver
- 9/16-inch wrench
- 10-mm wrench (either open-end or socket)
- 2-mm allen wrench
- ESD-preventive wrist or ankle strap
- Antistatic mat
- Tape measure
- Wire cutters
- Pliers

Safety and Compliance

The following guidelines will help to ensure your safety and protect the equipment. This list is not inclusive of all potentially hazardous situations, so be alert.

- General Safety Guidelines, page 2-3
- Preventing Electrostatic Discharge Damage, page 2-4
- Laser Safety, page 2-6
- Laser Safety, page 2-6
- Lifting Guidelines, page 2-6

General Safety Guidelines

The following are some general safety guidelines you should be aware of when installing or maintaining the Cisco XR 12404 Router.

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

- Always disconnect the power source and unplug all power cables before lifting, moving or working on the router.

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

- Keep tools and router components away from walk areas.

- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the router.

- Fasten your tie or scarf and sleeves.

- Cisco equipment operates safely when it is used in accordance with its electrical ratings and product usage instructions.

- Do not work alone if potentially hazardous conditions exist.

- Always unplug the power cables when performing maintenance or working on the router, unless the replacement part is capable of online insertion and removal, hot swappable.

- The installation of the router should be in compliance with national and local electrical codes: in the United States, National Fire Protection Association (NFPA) 70, United States National Electrical Code; in Canada, Canadian Electrical Code, part I, CSA C22.1; in other countries, International Electrotechnical Commission (IEC) 364, part 1 through part 7.

- Before installing, configuring, or maintaining the router, review the safety warnings listed in the document *Regulatory Compliance and Safety Information for the Cisco XR 12000 Series Routers*).

- A Cisco XR 12404 Router configured with the AC power entry module (PEM) are shipped with a three-wire electrical grounding-type plug that will only fit into a grounding-type power outlet. This is a safety feature. The equipment grounding should be in accordance with local and national electrical codes.

- A Cisco XR 12404 Router configured with a DC PEM requires a dedicated 35–Amp DC circuit breaker for the DC power source. This circuit breaker should protect against short-circuit and overcurrent faults in accordance with United States National Electrical Code NFPA 70 (United States), Canadian Electrical Code, part I, CSA C22.1; CSA C22.2 No. 0 (Canada) and IEC 364 (other countries).

- Only a DC power source that complies with the safety extra-low voltage (SELV) requirements in UL60950, CSA 60950, EN60950, and IEC 60950 can be connected to a Cisco XR 12404 Router DC PEM.

- A Cisco XR 12404 Router configured with a DC PEM is to be installed in a restricted access area and in accordance with Articles 110–18, 110–26, and 110–27 of the National Electric Code, ANSI/NFPA 70.

- A Cisco XR 12404 Router configured with a DC power distribution unit (PDU) shall have a readily accessible disconnect device incorporated in the fixed wiring.

Compliance and Safety Information

The Cisco XR 12404 Router is designed to meet the regulatory compliance and safety approval requirements. Refer to the *Regulatory Compliance and Safety Information for the Cisco XR 12000 Series Routers*.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage to circuit boards can occur if they are handled improperly. Such mishandling can result in intermittent or complete failures of the board.

When handling circuit boards, observe the following guidelines to prevent ESD damage.

- Always use an ESD-preventive ankle or wrist strap and ensure that the strap makes adequate contact with your skin.

- The ankle or wrist strap protects equipment from ESD voltages on the body only; ESD voltages on clothing can still cause damage to electronic components.

Attaching an ESD-Preventive Strap

Attach an ESD antistatic strap to your body and to an open metal part of the chassis on the Cisco XR 12404 Router (Figure 2-1).

Figure 2-1   *Attaching an ESD-Preventive Strap to the Cisco XR 12404 Router Chassis*

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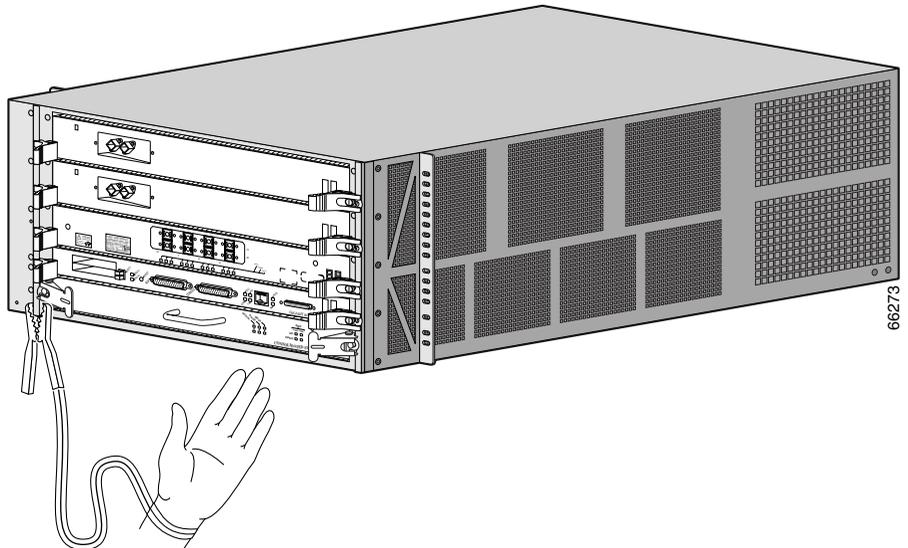
Caution   Periodically check the resistance value of the antistatic ankle or wrist strap. The resistance measurement should be between 1 and 10 megohms.

Laser Safety

Single-mode style line cards for the Cisco XR 12404 Router are equipped with lasers, which emit invisible radiation. Do not stare into open line card ports.

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Warning **Avoid exposure to laser radiation. Do not stare into an open apertures, because invisible laser radiation may be emitted from the aperture when a cable is not inserted in the port.**

Lifting Guidelines

A fully configured Cisco XR 12404 Router weighs approximately 100 pounds (45.36 kg). Before you install the router, ensure that your site is properly prepared so you can avoid having to move the router later to accommodate power source and network connections (Figure 2-2).

Figure 2-2   Lifting a Cisco XR 12404 Router
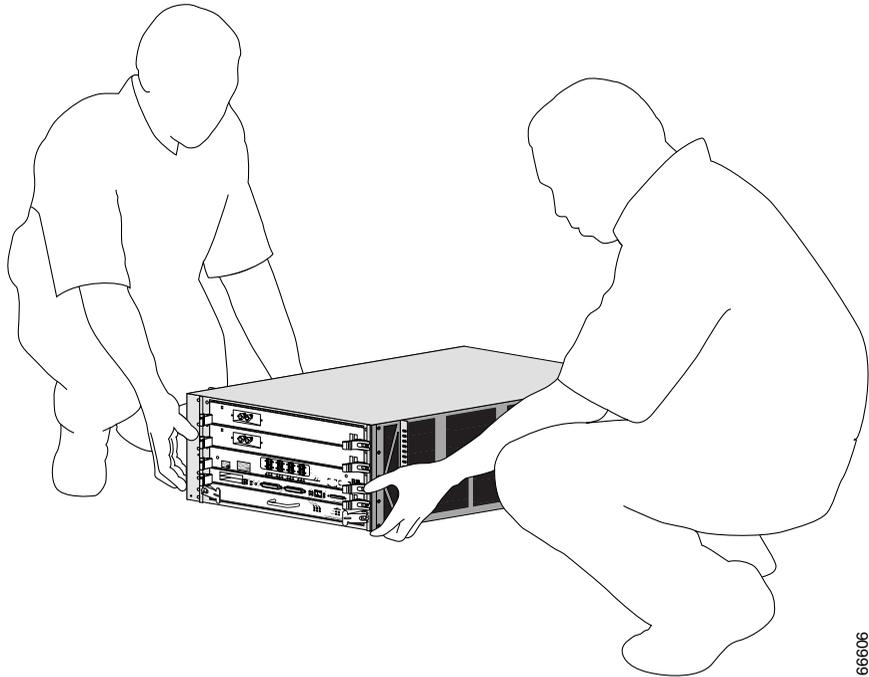
Each time you lift any heavy assembly, refer to these lifting guidelines:

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

- Have a second person available to help lift the assembly

- Ensure that your footing is solid; balance the weight of the object between your feet

- Lift the assembly slowly; never move suddenly or twist your body as you lift

- Keep your back straight and lift with your legs, not your back

- If you must bend down to lift the assembly, bend at the knees, not at the waist, to reduce the strain on your lower back muscle

- Always disconnect the power source and unplug all power cables before lifting, moving or working on the router

Cisco XR 12404 Router Installation Guide

Safety with Electricity

Most Cisco XR 12404 Router field replaceable units (FRUs) support online insertion and removal (OIR), which means an FRU is hot-swappable and can be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

Installation Site Requirements

This section provides site requirement guidelines that you must consider before installing the Cisco XR 12404 Router.

Rack-Mounting and Ventilation Guidelines

Before installing the Cisco XR 12404 Router in a rack, consider the following general rack-mounting guidelines.

As you face the rear of the chassis, the fan tray assembly is located on the right side. Air flow to the air filter and fan tray assembly should not be blocked.

Note   Warm air exhaust at the side of the chassis through the fan tray. Allow sufficient air flow by maintaining 6 inches (15.24 CM) of clearance at both the inlet and openings on the chassis.

- A ventilation system that is too powerful in an enclosed rack can also prevent cooling by creating negative air pressure around the chassis and redirecting the air away from the air intake vent. If necessary, operate the router with the rack door open or in an open rack.

- The correct use of baffles inside an enclosed rack can assist in cooling the router.

- Equipment located near the bottom of the rack can generate excessive heat that is drawn upward and into the intake ports of equipment above, leading to possible overheat conditions.

Rack Mounting Clearance

The rack-mounting hardware included with the Cisco XR 12404 Router is suitable for most 19 inch equipment racks.

The following are rack-mounting guidelines for the Cisco XR 12404 Router.

- If you use a standard 19 inch racks be sure that the rack is bolted to the floor. The chassis mounts to the two rack posts, and the rest of the chassis is cantilevered off of the posts.

- Ensure that the weight of the Cisco XR 12404 Router does not make the rack unstable.

- Some racks are secured to ceiling brackets, if necessary, because of the weight of the equipment in the rack. Make sure that the rack you are installing the Cisco XR 12404 Router in is secured.

- For the enhanced model of the Cisco XR 12404 Router, the mounting rails on a 4-post rack must be recessed no more than 1.5 inches for the front door to fully open and close and to provide adequate room for cable routing.

Multiple Routers in a Rack

One of the unique features of the Cisco XR 12404 Router is its size. Up to 8 Cisco XR 12404 Routers can fit in a standard 19 inch equipment rack. When placing multiple routers in a rack, ensure there is sufficient ventilation to accommodate the router.

The heated exhaust air from other equipment can enter the inlet air vents and cause an overtemperature condition inside the router.

- Install and use the line card brackets and chassis cable-management bracket included with the router to keep cables organized and out of the way of line cards.

- Ensure that cables from other equipment do not interfere with access to the card cage, or require you to disconnect cables unnecessarily to perform equipment maintenance or upgrades.

- When mounting the router in a four-post type rack, be sure to use all of the screws provided to secure the chassis to the rack posts.

Figure 2-3 shows the outer dimensions of the Cisco XR 12404 Router chassis with the front door installed.

Figure 2-3   Cisco XR 12404 Router Chassis Outer Dimensions—Top View
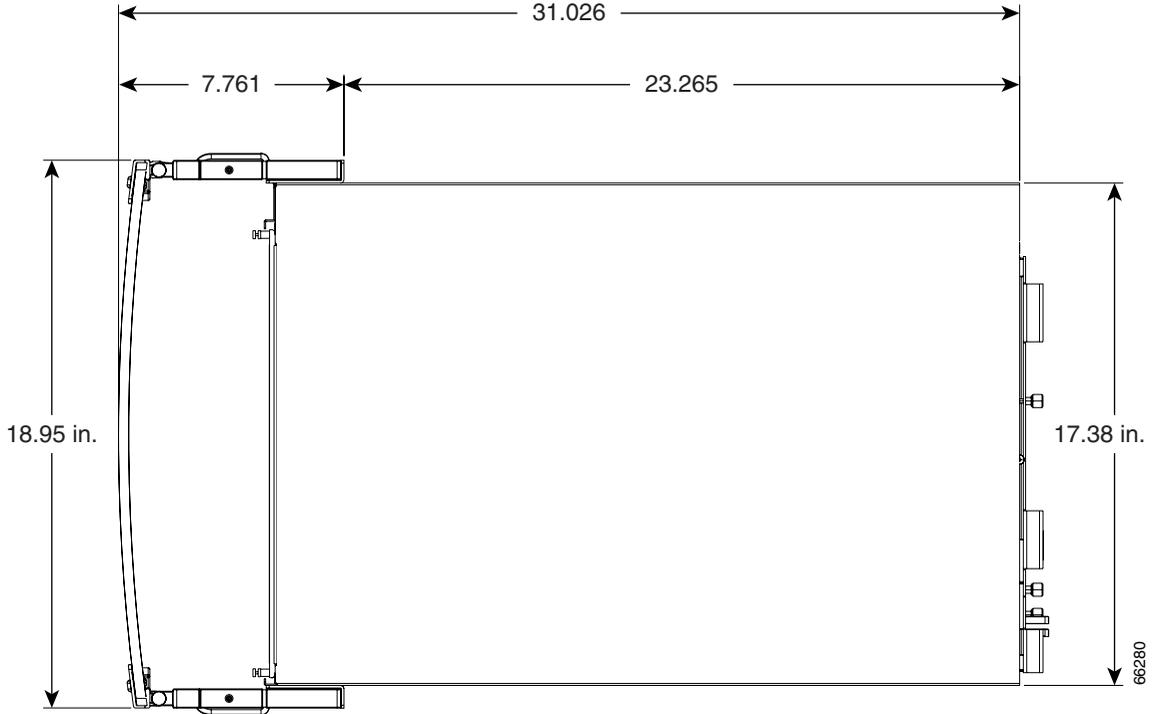
Environmental Guidelines

This section offers guidelines for operating your Cisco XR 12404 Router in various environments; airflow, temperature and humidity, power source, AC and DC powered routers, grounding connections and site wiring. To assure normal operation and avoid maintenance difficulty, plan and prepare your site before you install the router.

Airflow

The Cisco XR 12404 Router air circulation system consists of 1 fan tray assembly mounted at the side of the chassis. The fan tray assembly maintains acceptable operating temperatures for the internal components by drawing cooling air in through a replaceable air filter, located on the right side of the chassis.

Air circulates through the card cage, and exhausts at the side of the chassis (Figure 2-4).

- Allow sufficient air flow by maintaining 6 inches (15.24 cm) of clearance at both the inlet and exhaust openings on the chassis.
- The site should be as dust-free as possible. Dusty environments can clog the air filter, reducing the cooling airflow through the system. This can cause an over temperature condition in the router.

Under extreme environment conditions, the environmental monitoring system will shut down the power to protect the system components.

Figure 2-4   Cisco XR 12404 Router Air Circulation System
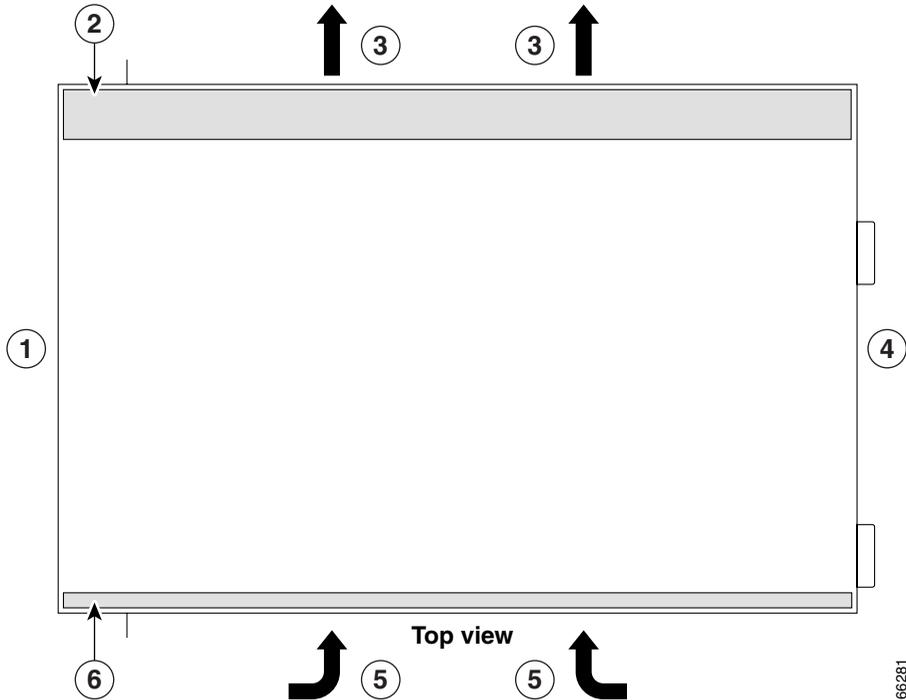
Temperature and Humidity

The operating environmental site requirements are listed in Appendix A. The temperature and humidity ranges listed are those within which the router will continue to operate. You can maintain normal operation by anticipating and correcting environmental irregularities before they approach critical values.

The environmental monitoring functionality built into the router protects the system and components from potential damage from overvoltage and overtemperature conditions.

Power Connection Guidelines

The Cisco XR 12404 Router requires an AC PEM or a combination DC PDU and DC PEM. Site requirements differ depending on the type of power source voltage. We recommend you follow these precautions and recommendations when planning power source connections to your router.

- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power from the power source.

- If necessary, install a power conditioner.

- Install proper grounding, or use the proper grounding receptacle located on the side of the chassis, to avoid damage from lightning and power surges.

AC-Powered Routers

A Cisco XR 12404 Router configured with two AC PEMs, are shipped with a three-wire electrical grounding-type plug that will only fit into a grounding-type power outlet. This is a safety feature. The equipment grounding should be in accordance with local and national electrical codes.

At sites where the Cisco XR 12404 Router operates with AC PEMs, observe the following guidelines (Figure 2-3):

- A power factor corrector (PFC) allows the PEM to accept AC power source voltage from an AC power source operating between 100 to 120 VAC, 15–Amp service in North America; and a range of 185 to 264 VAC, 10–Amp service, in an international environment.

- All AC PEM power cords measure 14 feet (4.3 meters).

- Provide a dedicated power source for each PEM installed in the router.

- Install an uninterruptable power source where possible.

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Caution   Use the North American plug L6-20 20A only on 240 volt systems.

Figure 2-5   Cisco XR 12404 Router AC Power Plugs
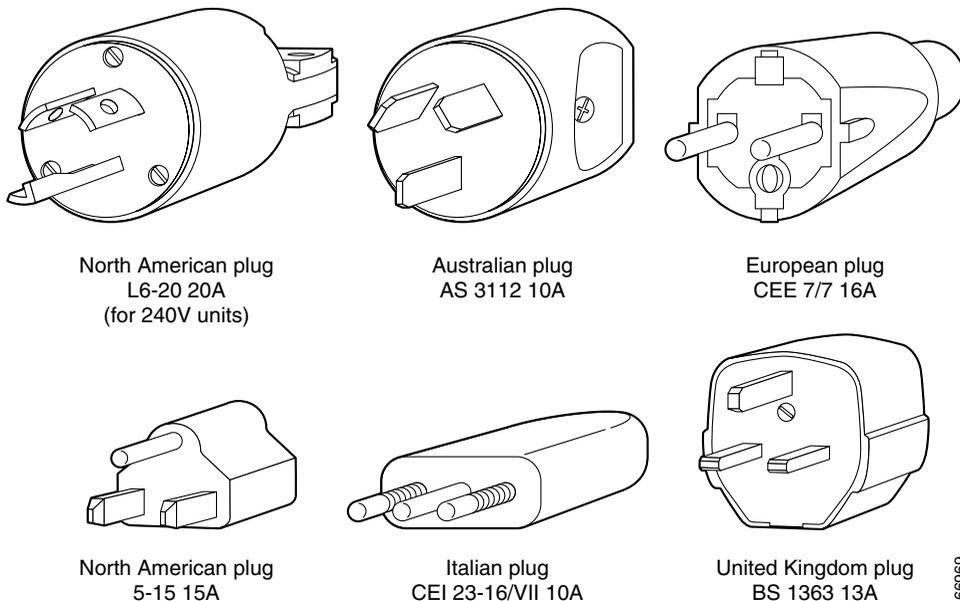
North American plug
L6-20 20A
(for 240V units)

Australian plug
AS 3112 10A

European plug
CEE 7/7 16A

North American plug
5-15 15A

Italian plug
CEI 23-16/VII 10A

United Kingdom plug
BS 1363 13A

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Power Connection Guidelines for DC-Powered Routers

When the Cisco XR 12404 Router operates with a DC PDU, observe these guidelines:

- A Cisco XR 12404 Router configured with a DC PDU and DC-input PEMs has a maximum power rating of 35A per power module and requires a dedicated DC power source to support this maximum current. The facility DC source circuit breaker protection needs to comply with safety local codes and regulations. This circuit breaker protects against short-circuit and overcurrent faults in accordance with United States National Electrical Code NFPA 70 (United States), Canadian Electrical Code, part I, CSA C22.1 (Canada), and IEC 364 (other countries).

- DC power cable leads should be #6 American Wiring Gauge (AWG) high-strand-count wire.

- Provide a dedicated power source for each power entry module installed in the router.

- Install an uninterruptable power source where possible.

Grounding Connections

Before you connect power or turn on your Cisco XR 12404 Router, you must provide an adequate system ground for the router. The equipment grounding should be in accordance with local and national electrical codes.

For installations other than in a network equipment building system (NEBS) environment, you may chose to rely on the safety earth ground connection supplied via the International Electrotechnical Commission (IEC) 320 inlets for AC-powered units and the main terminal block ground connection for DC-powered units.

Site Wiring

This section offers site wiring guidelines for setting up the plant wiring and cabling at your site. When planning the location of the new system, consider the following:

- Electromagnetic interference (EMI)
- Distance limitations for signaling and unshielded conductors

Electromagnetic Interference

Electromagnetic interference can occur between the signal on the wires and external or ambient EMI fields when the wires are run for any significant distance. This fact has two implications for the construction of plant wiring.

- Bad wiring practice can result in radio interference emanating from the plant wiring.

Warning   **Strong EMI, especially when it is caused by lightning or radio transmitters, can destroy the signal drivers and receivers in the Cisco XR 12404 Router, and can create an electrical hazard by conducting power surges through lines and may cause damage to the equipment.**

> ✎
>
> **Note** To predict and remedy strong EMI, you may 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.

Distance Limitations

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 (EMP) caused by lightning or other high-energy phenomena can easily couple 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.

Most data centers cannot resolve the infrequent but potentially catastrophic problems just described without pulse meters and other special equipment. These problems can cost a great deal of time to identify and resolve, so take precautions by providing a properly grounded and shielded environment, with special attention to issues of electrical surge suppression.

Unpacking and Repacking the Cisco XR 12404 Router

The shipping package for Cisco XR 12000 Series Routers is engineered to reduce the potential of product damage associated with routine material handling experienced during shipment. To minimize potential damage to the product, transport these products in their Cisco-specified packaging. Failure to do so may result in damage to the router or degradation of its performance. Also, do not remove the Internet router from its shipping container until you are ready to install it. The router should always be transported or stored in an upright position. Keep the router in the shipping container until you have determined where you will install it.

If you do not receive everything you ordered, contact a customer service representative for assistance. See the section titled, "Obtaining Documentation and Submitting a Service Request" section on page -x.

Transporting a Cisco XR 12000 Series Router

The shipping package for Cisco XR 12000 Series Routers is engineered to reduce the potential of product damage associated with routine material handling experienced during shipment. To minimize potential damage to the product, transport these products in their Cisco-specified packaging. Failure to do so may result in damage to the router or degradation of its performance. Also, do not remove the Internet router from its shipping container until you are ready to install it. The router should always be transported or stored in an upright position. Keep the router in the shipping container until you have determined a location for installation.

Site Preparation Checklist

Your Cisco XR 12404 Router is shipped with a site log (Table 2-1). Keep your site log in a location near the router where anyone who performs tasks can have access to it. Site log entries might include the following.

- Installation Progress—Make entries in the site log to record installation progress. You can note any difficulties encountered and remedies during the installation process.

- Upgrades, Removals, and Replacement Procedures—Use the site log as a record of system maintenance and expansion history.

  - FRU installed, removed, or replaced

  - Cisco XR 12404 Router configuration changes

  - Software upgrades

  - Corrective or preventive maintenance procedures performed

  - Intermittent problems

  - Your comments

Table 2-1 shows a sample site log. You can make copies of the sample or design your own site log.

Table 2-1   Sample Site Log

Date	Description of Action Performed or Symptom Observed	Initials