CHAPTER 2

Preparing to Install Cisco 4000 Series Routers

This chapter includes information you need before you install your Cisco 4000 series router. It includes the following sections:

- Safety Recommendations
- General Site Requirements
- Installation Checklist
- Site Log
- Required Tools and Equipment
- Inspecting the System

Safety Recommendations

The following guidelines will help to ensure your safety and protect the equipment.

- Keep the chassis area clear and dust-free during and after installation.
- Turn the power supply off and unplug the power cord before opening the chassis.

Warning Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. (To see translated versions of this warning, refer to the appendix “Translated Safety Warnings.”)

- Keep tools and chassis components away from walk areas.

- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.

Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. (To see translated versions of this warning, refer to the appendix "Translated Safety Warnings.")

- Wear safety glasses when working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

Warning This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use. (To see translated versions of this warning, refer to the appendix "Translated Safety Warnings.")

Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:

- Locate the emergency power-off switch in the room in which you are working. Then, if an electrical accident occurs, you can act quickly to shut the power off.
- Before working on the system, turn off the power and unplug the power cord.
- Disconnect all power before doing the following:
  - Installing or removing a chassis
  - Working near power supplies
- Do not work alone if potentially hazardous conditions exist.

- Never assume that power is disconnected from a circuit. Always check.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn off power to the system.
  - If possible, send another person to get medical aid. Otherwise, assess the victim's condition and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the guidelines that follow when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or other network cabling.

- Never install telephone wiring during a lightning storm.

Warning Do not work on the system or connect or disconnect cables during periods of lightning activity. (To see translated versions of this warning, refer to the appendix "Translated Safety Warnings.")

- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing cards. Ensure that the router chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground. To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

Caution For the safety of your equipment, periodically check the resistance value of the antistatic strap, which should be between 750 kilohm and 10 megohm.

General Site Requirements

This section describes the requirements your site must meet for safe installation and operation of your system. Ensure that your site is properly prepared before beginning installation.

The router can be placed on a desktop or rack-mounted in a data processing or lab environment. The system can be mounted in either a standard or telco rack. Optional rack-mount kits are available.

Site Environment

The location of individual chassis and the layout of your equipment rack or wiring room are extremely important for proper system operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause system malfunctions and shutdowns, and can make system maintenance difficult.

When planning your site layout and equipment locations, use the precautions described in the next section, “Site Configuration Precautions,” to help avoid equipment failures and reduce the possibility of environmentally caused shutdowns. If you are currently experiencing shutdowns or unusually high errors with your existing equipment, these precautions will help you isolate the cause of failures and prevent future problems.

Site Configuration Precautions

The following precautions will help you plan an acceptable operating environment for your router and will help you avoid environmentally caused equipment failures:

- Remember that electrical equipment generates heat. Ambient air temperature might not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Ensure that the room in which your system operates has adequate circulation.
- Never place chassis side by side because the heated exhaust air from one chassis can be drawn into the intake port of the next.
- Always follow the ESD-prevention procedures in the section "Preventing Electrostatic Discharge Damage" earlier in this chapter to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the chassis cover and network processor module rear panels are secure. The chassis is designed to allow cooling air to flow within it. An open chassis allows air leaks, which may in turn interrupt and redirect the flow of cooling air across internal components.
- Check the power at your site to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

Warning The device is designed to work with TN power systems. (To see translated versions of this warning, refer to the appendix "Translated Safety Warnings.")

- Install proper grounding to avoid damage from lightning and power surges.

Equipment Racks

The following tips will help you plan an acceptable equipment rack configuration:

- Enclosed racks must have adequate ventilation. Ensure that the rack is not overly congested because each unit generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the intake or the exhaust ports. If the chassis is installed on slides, check the position of the chassis when it is seated all the way into the rack.
- In an enclosed rack with a ventilation fan in the top, excessive heat generated by equipment near the bottom of the rack can be drawn upward and into the intake ports of the equipment above.
- Baffles can help to isolate exhaust air from intake air, which also helps to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack, which can be found by experimenting with different configurations.
- When equipment installed in a rack, particularly in an enclosed rack, fails, try operating the equipment by itself, if possible. Turn off other equipment in the rack (and in adjacent racks) to allow the unit under test a maximum of cooling air and clean power.

Power Supply Features

Following are features of the router power supply:

- Autoranging power supply (200W, 100 to 240 VAC, 50 to 60 Hz, 40 to 72 VDC)
- 6-foot electrical power cord

Warning Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. (To see translated versions of this warning, refer to the appendix “Translated Safety Warnings.”)

Installation Checklist

The Installation Checklist lists the procedures for initial hardware installation of a new router. Make a copy of this checklist and mark the entries as you complete each procedure. Include a copy of the checklist for each system in your Site Log. (See the next section "Site Log.")

Installation checklist for site_____

Task	Verified by	Date
Installation checklist copied		
Background information placed in Site Log		
Site power voltages verified		
Installation site prepower check completed		
Required tools available		
Additional equipment available		
Cisco 4000 series router received		
Cisco 4000 Series Installation Guide (this manual) received		
Cisco Information Packet received		
Optional ordered CD or printed documentation received		
Chassis components verified		
Initial electrical connections established		
ASCII terminal attached to console port, or modem attached to console port (for remote configuration)		
Signal distance limits verified		
Startup sequence steps completed		
Initial system operation verified		
Software image verified		

Site Log

The Site Log provides a historical record of all actions relevant to the router. Keep it in an accessible place near the chassis where anyone who performs tasks has access to it. Use the Installation Checklist to verify steps in the installation and maintenance of your router. Site Log entries might include the following:

- Installation progress—Make a copy of the Installation Checklist and insert it into the Site Log. Make entries as each procedure is completed.
- Upgrades and removal or replacement procedures—Use the Site Log as a record of ongoing router maintenance and expansion history. Each time a procedure is performed on the router, update the Site Log to reflect the following:
  - Additional network processor modules installed
  - Removal or replacement of network processor modules
  - Configuration changes
  - Maintenance schedules and requirements
  - Maintenance procedures performed
  - Intermittent problems
  - Related comments

Warning Ultimate disposal of this product should be handled according to all national laws and regulations. (To see translated versions of this warning, refer to the appendix "Translated Safety Warnings.")

Required Tools and Equipment

You need the following tools and equipment to install the router:

- ESD cord and wrist strap
- Screwdrivers, Number 1 and Number 2 Phillips
- One serial port adapter cable for each serial port to connect the port with the remote device or network

In addition, you might need the following additional external equipment:

- Data service unit (DSU) to connect each serial port to an external network.
- To connect a serial port to a T1 network, you need a 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. (Some telephone systems require a minimum number of one bit 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.
- Network Terminator 1 (NT1) for BRI connections in North America.
- Before installing a G.703/G.704 network processor module, ensure that you have one of the following adapter cables:
  - 75-ohm, unbalanced adapter cable (CAB-E1-BNC-3M)
  - 120-ohm, balanced adapter cable (CAB-E1-TWINAX-3M)

Inspecting the System

Before unpacking the system, make certain that you are ready to install it. If the final installation site is not ready, keep the chassis in its shipping container to prevent accidental damage. After determining where you want the system installed, proceed with the unpacking.

The router, cables, publications, CD, and any optional equipment you ordered might be shipped in more than one container. When you unpack each shipping container, check the packing list to ensure that you received all of the following items:

- Router
- 6-foot (1.8-meter) power cord
- Bag of rubber feet for desktop mounting
- Optional equipment (which might include network connection cables)

- This publication
- *Cisco Information Packet*
- Optional companion publications, or the Cisco Connection Documentation, Enterprise Series CD, as specified on your order

Inspect all items for shipping damage. If anything appears damaged, or if you encounter problems when installing or configuring your system, contact a customer service representative. Also, please complete and mail your product registration (see the publication *Cisco Information Packet*).