

# Preparing for Installation

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This chapter describes the equipment and site requirements for installing the Cisco 7204. The chapter contains the following sections:

- Safety Recommendations
- Site Requirements
- Tools for Installation
- Initial Configuration Information
- Cisco 7204 Installation Checklist
- Checking the Shipping Container Contents
- Site Log

Before installing your Cisco 7204 you should consider the power and cabling requirements that must be in place at your installation site, the equipment you will 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.

# Safety Recommendations

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

- The installation of your Cisco 7204 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, CC22.1. In other countries, International Electrotechnical Commission (IEC) 364, part 1 through part 7.
- Review the safety warnings listed in the document *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers* (Document Number 78-3419-xx) that accompanied your Cisco 7204, before installing, configuring, or maintaining the router.
- Never attempt to lift an object that might be too heavy for you to lift by yourself.
- Always turn all power supplies off (O) and unplug all power cables before opening the chassis.
- Always unplug the power cable before installing or removing a chassis.
- Keep the chassis area clear and dust free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the chassis. Fasten your tie or scarf and sleeves.
- The Cisco 7204 ships with a three-wire electrical grounding-type plug, which 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.
- The Cisco 7204 operates safely when it is used in accordance with its marked electrical ratings and product usage instructions.

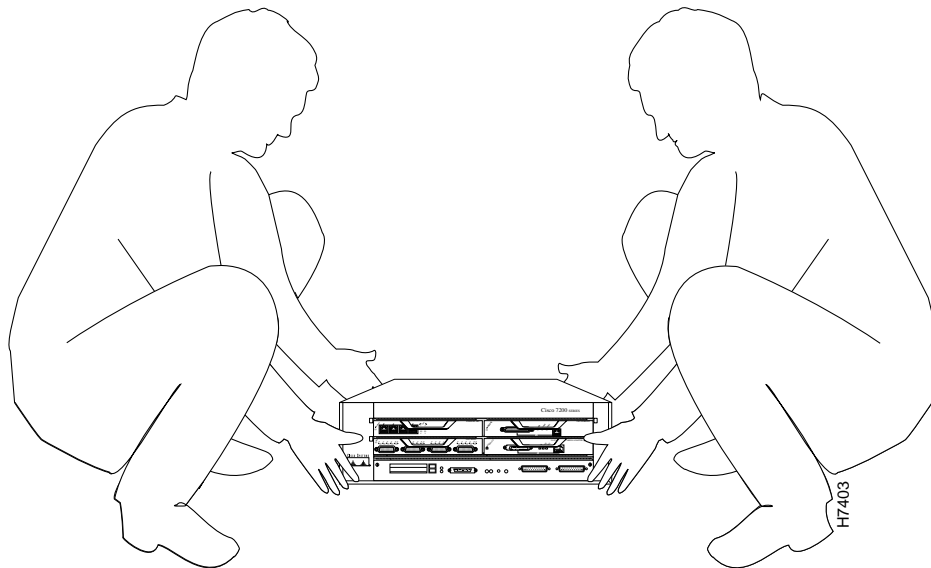
## Lifting Safely

A fully configured Cisco 7204 weighs approximately 50 pounds. The chassis is not intended to be moved frequently. Before you install the router, ensure that your site is properly prepared so you can avoid having to move the chassis later to accommodate power sources and network connections.

Whenever you lift the chassis or any heavy object, follow these guidelines (see Figure 2-1):

- Always disconnect all external cables before lifting or moving the chassis.
- Do not attempt to lift the chassis by yourself; have someone assist you.
- Ensure that your footing is solid, and balance the weight of the object between your feet.
- Lift the chassis 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 chassis, bend at the knees, not at the waist, to reduce the strain on your lower back muscles.
- Lift the chassis from the bottom; grasp the underside of the chassis exterior with both hands.

**Figure 2-1**      **Lifting the Chassis**



### Safety with Electricity

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 and network processing engine.

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before installing or removing a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

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.
- 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 has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

## 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, 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, I/O controller, and port adapters. Handle the carriers by the handles and the carrier edges only; never touch the boards or connector pins.



**Caution** Always tighten the captive installation screws on the network processing engine and I/O controller. (See Figure 1-4 and Figure 1-5.) These screws prevent accidental removal, provide proper grounding for the system, and help ensure that the bus connectors are properly seated in the midplane.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist strap or ankle strap and ensure that it makes good skin contact.
- When handling a removed network processing engine, I/O controller, or port adapter, make sure the equipment end of your ESD strap is attached to an unfinished chassis surface of the router; *do not* touch the printed circuit board, and avoid contact between the printed circuit board and your clothing. Always place the network processing engine, I/O controller, or port adapter component side up on an antistatic surface or in a static shielding bag. If you are returning the item to the factory, immediately place it in a static shielding bag.

## Site Requirements

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- Ensure the I/O controller and network processing engine are fully inserted in their respective chassis slots and their captive installation screws are tightened. The captive installation screws prevent accidental removal, provide proper grounding for the system, and help ensure that the bus connectors are seated in the midplane.
- Ensure that each port adapter is fully inserted in its chassis slot and the respective port adapter lever is in the locked position.



**Caution** For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohms.

## Site Requirements

The environmental monitoring functionality in the Cisco 7204 protects the system and components from potential damage from overvoltage and overtemperature conditions. To assure 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.

The following sections address the site environment requirements for the Cisco 7204.

### AC and DC Power

The AC-input power supply uses a power factor corrector that allows the Cisco 7204 to operate on input voltage and frequency within the ranges of 100 to 240 VAC and 50/60 Hz.

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**Note** We recommend attaching dual power supplies to independent power sources for full redundancy. We also recommend an uninterruptable power source to protect against power failures at your site. Each AC-input power supply operating at 120 VAC requires a minimum of 5A service. We recommend powering the Cisco 7204 from a 15A receptacle at the power source.

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The DC-input power supply allows the Cisco 7204 router to operate at –48 VDC nominal in North America and –60 VDC in Europe.



**Caution** If you are using the DC-input power supply, the router can only be installed in an area that is in accordance with articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

Refer to Table 1-1 in the chapter “Product Overview” for system power specifications, including input voltage and operating frequency ranges.

## Plant Wiring

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, electromagnetic interference (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 7204, and can even create an electrical hazard by conducting power surges through lines and into equipment. (Review the safety warnings in the section “Safety with Electricity” earlier in this chapter.)

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

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## Site Requirements

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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.



**Warning** A 15A DC circuit breaker is recommended for the DC power source that supplies power to the DC-input power supply. The circuit breaker protects against excess currents, short circuits, and earth faults in accordance with the United States National Electrical Code (U.S.), Canadian Electrical Code (Canada), and the International Electrotechnical Commission 364 (in other countries). A readily available disconnect device must be incorporated into the building wiring. To see translated versions of this warning, refer to the publication *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers* (Document Number 78-3419-xx) that accompanied your Cisco 7204.

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 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.

## 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.



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

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When preparing your site for network connections to the Cisco 7204, 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

Before installing the Cisco 7204, have all additional external equipment and cables on hand. The information listed above is contained in the documentation that is shipped with each port adapter. For example, if you need Token Ring distance limitations and pinouts, refer to the document *PA-4R Token Ring Port Adapter Installation and Configuration* (Document Number 78-2661-xx). This configuration note accompanies each Token Ring port adapter that is shipped from the factory as an installed item in a Cisco 7204 and as a FRU.

For ordering information, contact a customer service representative.

### Equipment Racks

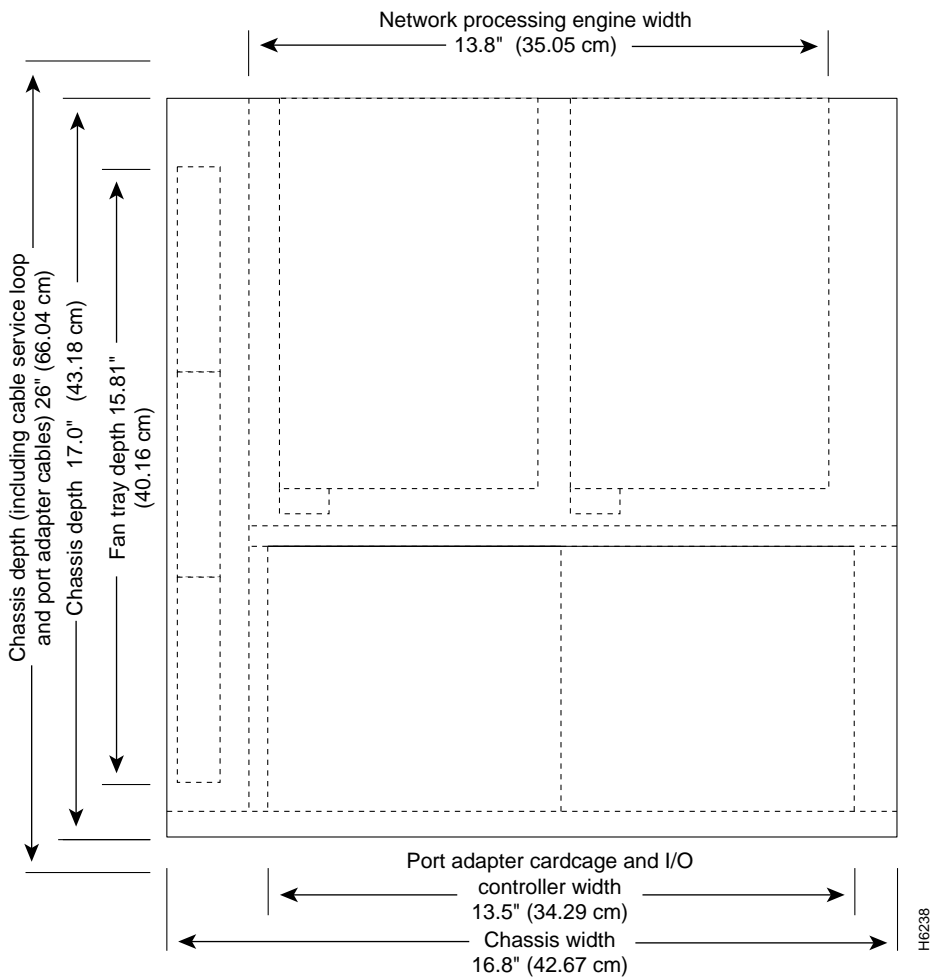
The rack-mounting hardware included with the Cisco 7204 is suitable for most 19-inch equipment racks and Telco-type racks. To easily access FRUs while the router is installed in a rack, make certain you have access to the front and rear of the router.

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 the Cisco 7204 in the rack, then replace it after the chassis is installed. As an alternative, you can mount the Cisco 7204 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 the Cisco 7204. Figure 2-2 shows the Cisco 7204 footprint and outer dimensions.

To use the rack-mounting hardware provided with the Cisco 7204, 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 four-post or Telco-type racks, be sure to use all the screws and brackets provided to secure the chassis to the rack posts.

Figure 2-2 Cisco 7204 Footprint and Outer Dimensions



## Site Requirements

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When planning your rack installation, consider the following guidelines:

- Install the Cisco 7204 in an open rack whenever possible. If installation in an enclosed rack is unavoidable, ensure that the rack has adequate ventilation.
- 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 will need if you are designing a customized shelf. We recommend that you use the rack-mount kit designed for the Cisco 7204.
- 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 7204 FRUs.
- Maintain a minimum clearance of three inches on the right and left of the chassis for the cooling air inlet and exhaust ports, respectively. Avoid placing the Cisco 7204 in an overly congested rack or directly next to another equipment rack; otherwise, the heated exhaust air from other equipment can enter the inlet air vents and cause an overtemperature condition inside the router.
- Always install heavier equipment in the lower half of a rack to maintain a low center of gravity and prevent the rack from falling over.
- If you use Telco-type racks, be sure that the rack is bolted to the floor and secured because in these types of installations only one end of the chassis mounts to the two rack posts with the brackets. Ensure that the weight of the chassis does not make the rack unstable.

In addition to the preceding guidelines, review the precautions for avoiding overtemperature conditions in the following section “Site Environment.” To properly install the Cisco 7204 chassis in a rack, refer to the instructions in the section “Rack-Mounting the Cisco 7204” in the chapter “Installing the Cisco 7204.”



**Caution** To prevent chassis overheating, never install the Cisco 7204 in an enclosed rack or room that is not properly ventilated or air conditioned.

## Site Environment

Table 2-1 lists the operating and nonoperating environmental site requirements. The following ranges are those within which the Cisco 7204 will 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.

- Operating temperature range: 32 through 104 F (0 through 40 C).
- Operating humidity range: 10 to 90%, noncondensing.
- Airflow: Cooling air is drawn in through the air intake vent on the right side of the chassis (when viewing the router from the front) and is exhausted through the left side of the chassis. Keep the right and left side of the chassis clear of obstructions and away from the exhaust of other equipment.

**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	10,000ft (3050 m)
Vibration, operating	5–200 Hz, 0.5 g (1 oct./min.)	–
Vibration, nonoperating	5–200 Hz, 1 g (1 oct./min.) 200–500 Hz, 2 g (1 oct./min.)	–

### Preventive Site Configuration: Maintaining Normal Operation

Planning a proper location for the Cisco 7204 and the layout of your equipment rack or wiring closet are 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.

#### General Precautions

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 the Cisco 7204 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, I/O controller, port adapters, any blank port adapters, 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.

#### Power Considerations

Follow these precautions and recommendations when planning power connections to the Cisco 7204:

- 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.

## Tools for Installation

Your Cisco 7204 chassis is fully assembled at the factory; no assembly is required. However, you will need the following tools and equipment to install the chassis and the rack-mount kit:

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

The rack-mount kit includes the following parts:

- Two brackets
- Four M4 x 10-mm Phillips flathead screws to secure the brackets to the chassis
- Eight 10-32 x 3/8-inch slotted binderhead screws to secure the brackets to the rack rails

In addition, you might need the following external equipment:

- 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.
- 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 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 media attachment unit (MAU).
- Optical bypass switch or concentrator for multimode Fiber Distributed Data Interface (FDDI) connections.

## 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** command 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 with 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 will 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 the Cisco Connection Documentation, Enterprise Series CD, or in print.



## Cisco 7204 Installation Checklist

To assist you with your installation and to provide a historical record of what was done, by whom, use the Cisco 7204 Installation Checklist in Table 2-2. 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.

## Cisco 7204 Installation Checklist

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**Table 2-2 Cisco 7204 Installation Checklist**

<b>Task</b>	<b>Verified by</b>	<b>Date</b>
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)		
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 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, and all port adapters operational (enabled LEDs on the port adapters and the I/O controller are on)		
Console screen displays correct hardware configuration (displayed after system banner)		
System ready for global and interface-specific configuration		

## Checking the Shipping Container Contents

Once you receive your Cisco 7204 router, use the following procedure to check the contents of the shipping container. Use the Cisco 7204 Installation Checklist in Table 2-2 and the Cisco 7204 Component List in Table 2-3 to ensure you received all the components you ordered.

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**Note** Do not discard the shipping container. You will need the container if you move or ship the Cisco 7204 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 7204 router, fully assembled (except the rack-mount kit)
- One or more accessories boxes (some or all may be shipped separately)

**Step 2** Check the contents of the accessories box against the Installation Checklist 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 kit (two brackets and mounting screws)
- Optional equipment that you ordered, such as network interface cables, transceivers, or special connectors
- Cisco 7204 hardware and software documentation, if ordered

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**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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## Checking the Shipping Container Contents

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**Step 3** Verify that the port adapters installed in your Cisco 7204 match the port adapter types on the packing list.

**Step 4** Proceed to the section “Site Log” in this chapter, then to the chapter “Installing the Cisco 7204,” to begin installation.

**Table 2-3 Cisco 7204 Component List**

Component	Description	Received
Chassis	Cisco 7204 chassis configured with a network processing engine, I/O controller, up to two AC or DC power supplies, up to four port adapters (blank port adapters should be installed in empty port adapter slots), and up to two Flash memory cards	
Accessories:	The following accessories might arrive in separate shipping containers:	
Rack-mount kit	Two brackets, four M4 x 10-mm Phillips flathead screws, and eight 10-32 x 3/8-inch slotted binderhead screws	
Power cables	Up to two power cables	
Documentation	Router hardware and software documentation set and the Cisco Connection Documentation, Enterprise Series CD <sup>1</sup>	

1. 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 7204 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 7204 Installation Checklist and insert it into the site log. Make entries on the Installation Checklist as each procedure is completed.
- Upgrades and removal/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, or replaced
  - I/O controller removed and replaced
  - Network processing engine removed and replaced
  - Subchassis removed and replaced
  - Fan tray 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 shows a sample site log page. Make copies of the sample or design your own site log to meet the needs of your site and equipment.

### Table 2-4 Site Log Example

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