Product Overview

This chapter provides physical and functional overviews of the Cisco 7204 router. It contains physical descriptions of the router hardware and major components, and functional descriptions of hardware-related features. Descriptions and examples of software commands are included only when they are necessary for replacing, installing, configuring, or maintaining the router hardware.

The Cisco 7204 is part of the Cisco 7200 series routers, which consists of the 2-slot Cisco 7202, 4-slot Cisco 7204 and Cisco 7204VXR, and 6-slot Cisco 7206 and Cisco 7206VXR. The Cisco 7204 supports multiprotocol, multimedia routing and bridging over a wide variety of LAN and WAN interface types.

Network interfaces reside on port adapters that provide the connection between the router's three Peripheral Component Interconnect (PCI) buses and external networks. The Cisco 7204 has four slots (slot 1 through slot 4) for the port adapters, one slot for an Input/Output (I/O) controller, and one slot for a network processing engine. You can place the port adapters or service adapters in any of the four available slots.

There are bays for up to two AC-input or DC-input power supplies. The Cisco 7204 will operate with one power supply. While a second power supply is not required, it allows load sharing and increased system availability.

Note The Cisco 7204 does not support a mixture of AC- and DC-input power.

The Cisco 7204 provides the following features:

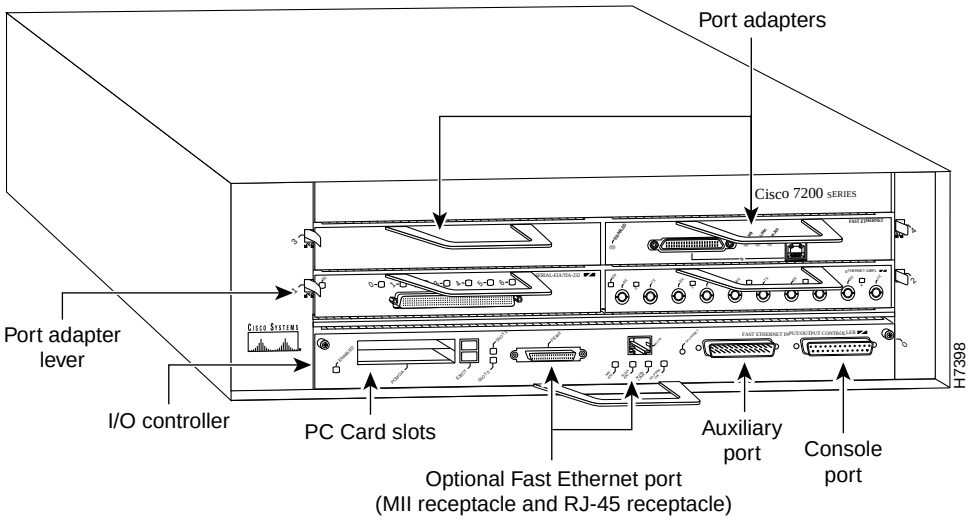
- Online insertion and removal (OIR)—Allows you to add, replace, or remove port adapters without interrupting the system or entering any console commands.
- Dual hot-swappable, load-sharing power supplies—Provide system power redundancy; if one power supply or power source fails, the other power supply maintains system power without interruption. Also, when one power supply is powered off and removed from the router, the second power supply immediately takes over the router's power requirements without interrupting normal operation of the router.
- Environmental monitoring and reporting functions—Allow you to maintain normal system operation by resolving adverse environmental conditions before any loss of operation.
- Downloadable software—Allows you to load new images into Flash memory remotely, without having to physically access the Cisco 7204 router, for fast, reliable upgrades.

Physical Description

The front of the Cisco 7204 provides access to an I/O controller and up to four network interface port adapters (see Figure 1-1). The I/O controller contains the following: a local console port for connecting a data terminal (or data terminal equipment [DTE]) and an auxiliary port for connecting a modem (or other data communications equipment [DCE]) or other devices for configuring and managing the router; two Personal Computer Memory Card International Association (PCMCIA) slots for Flash memory cards; an optional Fast Ethernet port. The Fast Ethernet port provides a 100-Mbps connection to the network.

Note The I/O controller is available with or without a Fast Ethernet port. The I/O controller with a Fast Ethernet port is equipped with either a single MII port or an MII port and an RJ-45 port (only one port can be used at a time). Although still supported by Cisco Systems, the I/O controller equipped with the single MII port was discontinued as an orderable product in May 1998.

Figure 1-1 Cisco 7204 Router—Front View



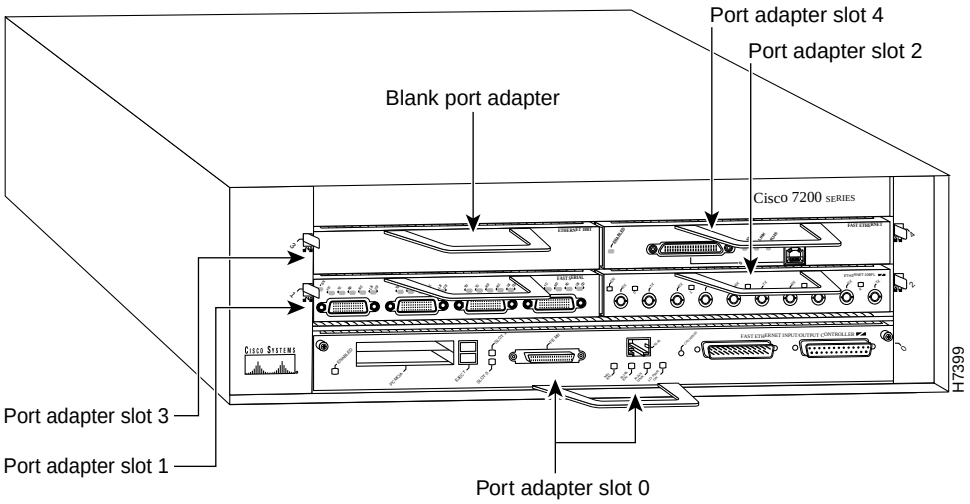
The port adapters installed in the Cisco 7204 are of the same type as those installed on the second-generation Versatile Interface Processors (VIP2s) in the Cisco 7500 series routers, in Cisco 7000 series routers using the 7000 Series Route Switch Processor (RSP7000) and 7000 series Chassis Interface (RSP7000CI), and in the Cisco uBR7200 series routers. The port adapters installed in the Cisco 7204 support OIR. For an explanation of OIR, refer to the section "Online Insertion and Removal" section on page 1-25.

Note The I/O controller does not support OIR. You *must* power down the Cisco 7204 before removing the I/O controller from the router.

Port adapter slots in the Cisco 7204 router are numbered from left to right, beginning with port adapter slot 1 and continuing through port adapter slot 4. Port adapter slot 0 is the Fast Ethernet port on the I/O controller (refer to Figure 1-2).

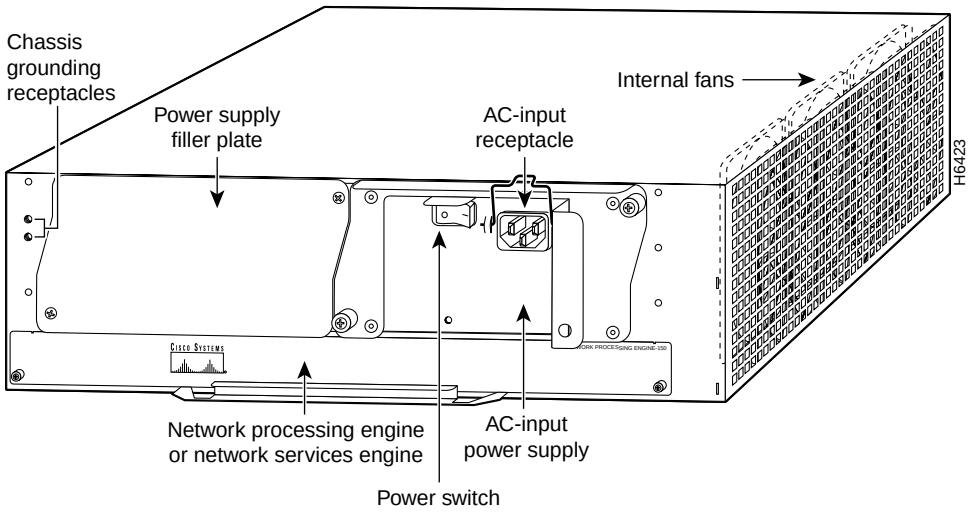
Note In Figure 1-1 and Figure 1-2, a blank port adapter is installed in slot 3. To ensure adequate airflow across the port adapters, each port adapter slot must be filled with either a port adapter or a blank port adapter.

Figure 1-2 Port Adapter Slot Numbering



The rear of the Cisco 7204 router provides access to the network processing engine and up to two power supplies (refer to Figure 1-3).

Figure 1-3 Cisco 7204 Router—Rear View



Note The network processing engine does not support OIR. You *must* power down the Cisco 7204 before removing the network processing engine from the router.

The network processing engine has no external connectors or LEDs. There is a handle for removing and installing the network processing engine and two captive installation screws for securing it to the chassis.

The Cisco 7204 router comes equipped with one 280W AC-input or one 280W DC-input power supply. A fully configured Cisco 7204 router operates with only one installed power supply; however, a second, optional power supply of the same type provides hot-swappable, load-sharing, redundant power. Figure 1-3 shows the rear of a Cisco 7204 router configured with a single AC-input power supply. (A power supply filler plate is installed over the second power supply bay.)

Caution Do not mix power supplies in the Cisco 7204. In dual power supply router configurations, both power supplies *must* be of the same type (two AC-input power supplies or two DC-input power supplies).

The power supply has the router's main power switch and either an AC-input power receptacle or a hardwired DC-input power cable (depending on the type of installed power supply).

Adjacent to the power supply bays there are two chassis ground receptacles that provide a chassis ground connection for ESD equipment or a two-hole grounding lug (refer to Figure 1-3).

Three internal fans draw cooling air into chassis and across internal components to maintain an acceptable operating temperature. (Refer to Figure 1-3.) The three fans are enclosed in a tray that is located in the subchassis.

Caution To ensure the proper flow of cooling air across the internal components, make sure blank port adapters are installed in unoccupied port adapter slots, and power supply filler plates are installed in unoccupied power supply bays.

The I/O controller, port adapters, power supplies, and network processing engine slide into their respective chassis slots and connect directly to the router's midplane; there are no internal cables to connect. The midplane distributes DC power from the power supplies to the I/O controller, port adapters, fan tray, and network processing engine.

The midplane also identifies OIR of the port adapters, bridges the PCI buses from the port adapters to packet static random-access memory (SRAM) on the network processing engine, arbitrates traffic across the PCI buses, and generates the clock signals for the port adapters on each PCI bus.

The Cisco 7204 operates as either a tabletop or rack-mounted unit. A rack-mount kit is standard equipment included with all Cisco 7204 routers when they are shipped from the factory. The kit provides the hardware needed to mount the router in a standard 19-inch equipment rack or a 2-post rack. Steps for installing the Cisco 7204 router in an equipment rack are explained in Chapter 3, "Installing the Cisco 7204." If you are not rack-mounting your Cisco 7204, place it on a sturdy tabletop or platform.

A fully configured Cisco 7204, with two installed power supplies and all chassis slots filled, weighs approximately 50 pounds (22.7 kilograms [kg]). For clearance requirements and rack-mount installation considerations, refer to the section "Site Environment" in Chapter 2, "Preparing for Installation."

System Specifications

Table 1-1 lists the Cisco 7204 router physical specifications and power requirements.

Table 1-1 Cisco 7204 Physical Specifications

Description	Specification
Midplane	Two primary PCI buses and one secondary PCI bus with an aggregate bandwidth of 600 Mbps[1]
Dimensions (H x W x D)	5.25 in. x 16.8 in. x 17 in. (13.34 cm x 42.67 cm x 43.18 cm)
Weight	Chassis fully configured with a network processing engine, I/O controller, 4 port adapters, 2 power supplies, and a fan tray: ~ 50 lb (22.7 kg)
Heat dissipation	370W (1262 Btu[2])
AC-input voltage rating	100-240 VAC[3] wide input with power factor correction
AC-input current rating	5A[4] at 100-240 VAC with the chassis fully configured
AC-input frequency rating	50/60 Hz[5]
AC-input cable	18 AWG[6] three-wire cable, with a three-lead IEC-320 receptacle on the power supply end, and a country-dependent plug on the power source end
DC-output power	280W maximum (with either a single or a dual power supply configuration)
DC-input voltage rating	–48 VDC[7] nominal in North America –60 VDC nominal in the European Community
DC-input current rating	13A at –48 VDC (370W/–48 VDC = 7.7A typical draw) 8A at –60 VDC (370W/–60 VDC = 6.2A typical draw)
DC voltages supplied and maximum, steady-state current ratings	+5.2V @ 30A +12.2V @ 9A –12.0V @ 1.5A +3.5V @ 13A
DC-input cable	In accordance with local and national wiring regulations
Airflow	~80 cfm[8]
Temperature	32 to 104°F (0 to 40°C) operating; –4 to 149°F (–20 to 65°C) nonoperating
Humidity	10 to 90% noncondensing

1. Mbps = megabits per second.
2. Btu = British thermal units.
3. VAC = volts alternating current.
4. A = amperes.
5. Hz = hertz.
6. AWG = American Wire Gauge.
7. VDC = volts direct current.
8. cfm = cubic feet per minute.

Note For a chassis footprint, additional dimensions, and clearance requirements for the Cisco 7204 perimeter, refer to the section "Site Requirements" section on page 2-4 in Chapter 2, "Site Requirements."

Software Requirements

Below are the recommended minimum software requirements for the Cisco 7204:

- Cisco IOS Release 11.1(17)CA or a later release of Cisco IOS 11.1 CA
- Cisco IOS Release 11.2(12)P or a later release of Cisco IOS 11.2 P
- Cisco IOS Release 11.3(2)T or a later release of Cisco IOS 11.3 T
- Cisco IOS Release 12.0(3)T or a later release of 12.0 T

Note For software inforamtion for the Cisco AS5800 Universal Access Server, refer to the Cisco AS5800 Universal Access Server documentation listed on Cisco.com at http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/as5800/index.htm.

Field-Replaceable Units

The Cisco 7204 router is easy to service; all its major components are field replaceable units (FRUs). The following Cisco 7204 components are FRUs:

- Network processing engine
- Input/Output controller
- Port adapters and service adapters
- Power supplies
- Fan tray
- Chassis
- PCMCIA Flash Disks and Flash memory cards
- Rack-mount and cable-management kit

The following sections provide brief overviews of each FRU.

Instructions for removing and replacing FRUs are contained in separate documents. For example, if you need to replace the I/O controller in your Cisco 7204 router, refer to the *Input/Output Controller Replacement Instructions* document. The document is available on Cisco.com.

For ordering information, contact a customer service representative.

Network Processing Engine

The network processing engine maintains and executes the system management functions for the Cisco 7204 router. The network processing engine also shares the system memory and environmental monitoring functions with the I/O controller.

Note Detailed instructions for removing and replacing the network processing engine are contained in the *Network Processing Engine or Network Services Engine Installation and Configuration*. This document is available on Cisco.com.

The network processing engine is available in four versions: the NPE-100, NPE-150, NPE-200, and NPE-300.

Network processing engines have the same functionality; however, their performance differs because of the microprocessor type and the type of memory for packet data (SRAM and DRAM, or SDRAM) each network processing engine provides.

Note The Cisco 7204 supports all versions of the network processing engine except the NPE-300; therefore, the NPE-300 is not explained in this publication. (The NPE-300 is keyed so that it can only be installed in Cisco 7200 VXR routers.) For information about the NPE-300 and its use in the Cisco 7200 VXR routers, refer to the *Cisco 7200 VXR Installation and Configuration Guide* publication.

The NPE-100, NPE-150, and NPE-200 consist of the following components:

- Reduced instruction set computing (RISC) microprocessor
  - The NPE-100 and the NPE-150 have an R4700 microprocessor that operates at an internal clock speed of 150 megahertz (MHz).
  - The NPE-200 has an R5000 microprocessor that operates at an internal clock speed of 200 MHz.
- System controller that uses direct memory access (DMA) to transfer data between DRAM and packet SRAM on the network processing engine.
- DRAM for storing routing tables, protocols, network accounting applications, packets of information in preparation for process switching, and packet buffering for SRAM overflow. The standard configuration is 32 megabytes (MB), with up to 128 MB available through single in-line memory module (SIMM) upgrades.
- Packet SRAM for storing packets of information in preparation for fast switching.
  - The NPE-100 does not have SRAM.
  - The NPE-150 has 1 MB of SRAM.
  - The NPE-200 has 4 MB of SRAM.
- Unified cache SRAM that functions as the secondary cache for the microprocessor. (The primary cache is within the microprocessor.)
- Two environmental sensors for monitoring the cooling air as it leaves the Cisco 7204 chassis.
- Boot ROM for storing sufficient code for booting the Cisco IOS software. (This component is only available on the NPE-200.)

The network processing engines perform the following system management functions:

- Sending and receiving routing protocol updates
- Managing tables, caches, and buffers
- Monitoring interface and environmental status
- Providing Simple Network Management Protocol (SNMP) management and the console/Telnet interface
- Accounting and switching of data traffic
- Booting and reloading images
- Managing port adapters (recognition and initialization during OIR)

Figure 1-4 shows the NPE-100, Figure 1-5 shows the NPE-150, and Figure 1-6 shows the NPE-200.

Figure 1-4 Network Processing Engine—100

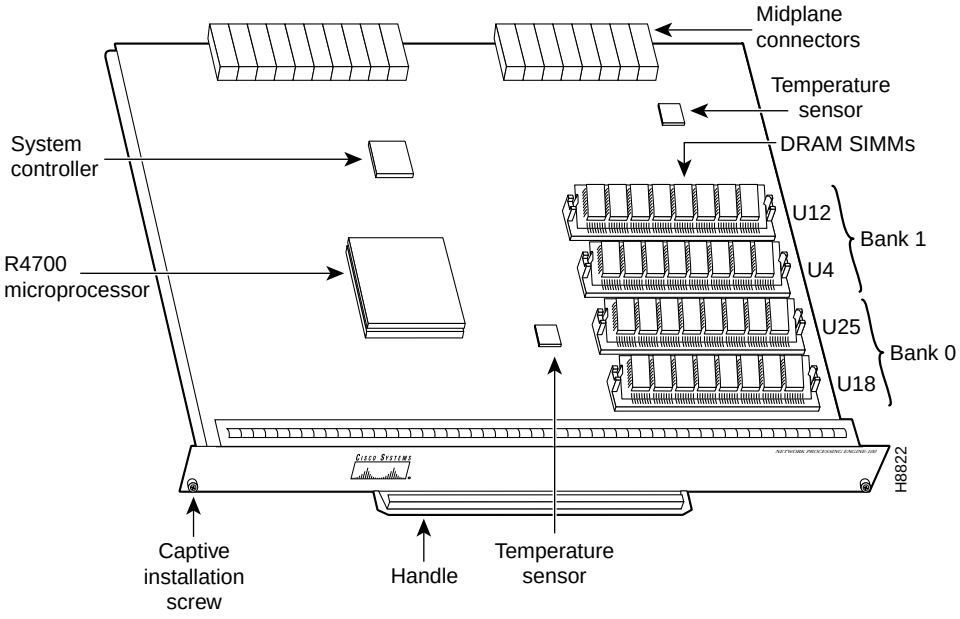


Figure 1-5 Network Processing Engine—150

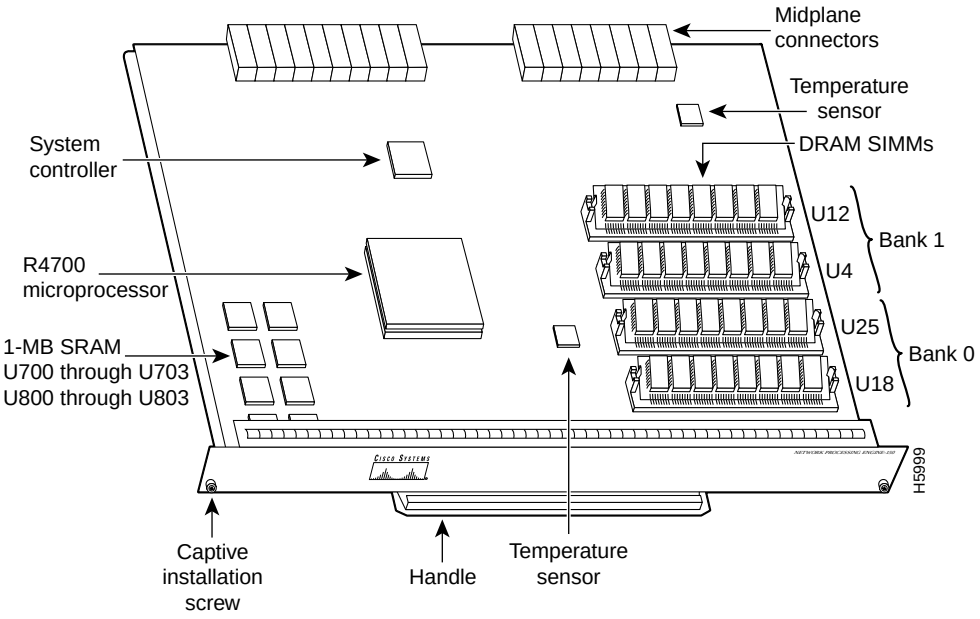


Figure 1-6 Network Processing Engine—200

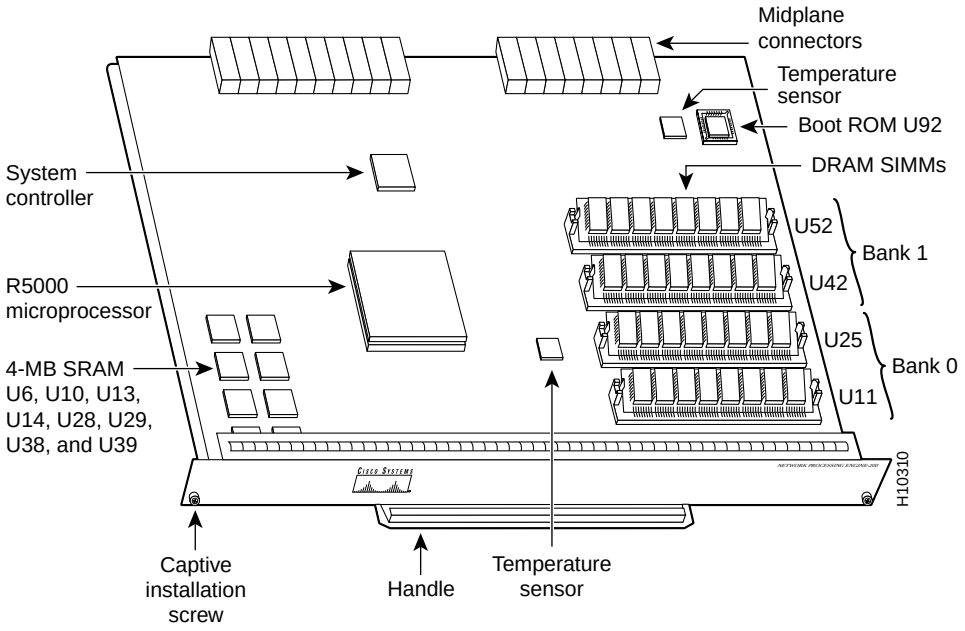


Table 1-1 lists the network processing engine memory components.

Table 1-2 Network Processing Engine Memory Components (NPE-100, NPE-150, and NPE-200)

Memory Type	Size	Quantity	Description	Location
DRAM	32 MB to 128 MB	2 or 4	16- or 32-MB SIMMs (based on maximum DRAM required)	Bank 0: U18 and U25 or U11 and U25[1] Bank 1: U4 and U12 or U42 and U52[2]
SRAM[3]				
NPE-150	1 MB	8	8 chips, each being 128K words x 9 bits wide	U700 through U703 U800 through U803
NPE-200	4 MB	8	8 chips, each being 512K words x 8 bits wide	U6, U10, U13, U14, U28, U29, U38, and U39
Boot ROM[4] (NPE-200 only)	256 KB	1	PLCC-type integrated circuit for the ROM monitor program	Socket U92
Unified cache	512 KB	4	Secondary cache for the R4700 and R5000 RISC processors	NPE-100 and NPE-150 U2, U10, U14, and U26 NPE-200 U16, U9, U109, and U107

1. The sockets for bank 0 on the NPE-100 and the NPE-150 are numbered U18 and U25. The same sockets on the NPE-200 are numbered U11 and U25.
2. The sockets for bank 1 on the NPE-100 and the NPE-150 are numbered U4 and U12. The same sockets on the NPE-200 are numbered U42 and U52.
3. The NPE-100 does not have SRAM.
4. ROM = read-only memory.

Note To prevent DRAM errors and to ensure your system initializes correctly at startup, DRAM bank 0 (socket U18 and U25, or U11 and U25) *must* contain no fewer than two SIMMs of the same type. You may also install two SIMMs of the same type in bank 1 (socket U4 and U12, or U42 and U52); however, bank 0 must always contain the two largest SIMMs.

Table 1-3 lists the network processing engine factory-installed DRAM configurations and their product numbers.

Table 1-3 DRAM SIMM Configurations (NPE-100, NPE-150, and NPE-200)

Total DRAM	DRAM Bank 0	Quantity	DRAM Bank 1	Quantity	Product Number
32 MB	U18 and U25 or U11 and U25	2 16-MB SIMMs	U4 and U12 or U42 and U52	–	MEM-NPE-32MB[1]
64 MB	U18 and U25 or U11 and U25	2 32-MB SIMMS	U4 and U12 or U42 and U52	–	MEM-NPE-64MB[1]
128 MB	U18 and U25 or U11 and U25	2 32-MB SIMMs	U4 and U12 or U42 and U52	2 32-MB SIMMs	MEM-NPE-128MB[1]

1. These products are also available as DRAM upgrades. For example, to upgrade a network processing engine from 32 MB to 64 MB of DRAM, order product number MEM-NPE-32MB=. A 16 MB-option (product number MEM-NPE-16MB=), which consists of two 8-MB SIMMs, is also available from the factory as a DRAM upgrade.

Use the **show version** command to identify the network processing engine installed in your Cisco 7204 router. The following example shows an installed NPE-150:

```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Released Version 11.1(17)CA
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sun 04-Aug-96 06:00 by rmontino
Image text-base: 0x60010890, data-base: 0x605F0000

  (display text omitted)

cisco 7204 (NPE 150) processor with 12288K/4096K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.

  (display text omitted)
```

Input/Output Controller

The Input/Output controller shares the system memory functions and the environmental monitoring functions for the Cisco 7204 router with the network processing engine.

Note Detailed instructions for removing and replacing the I/O controller are contained in the configuration note *Input/Output Controller Replacement Instructions*. The configuration note is also available on Cisco.com.

The I/O controller consists of the following components:

- Dual EIA/TIA-232 channels for local console and auxiliary ports. The console port has full DCE functionality and a DB-25 port. The auxiliary port has full DTE functionality and a DB-25 plug.
- An optional Fast Ethernet port, equipped with either a single MII port (see Figure 1-7) or an MII port and an RJ-45 port (see Figure 1-8), that is configurable for use at 100 megabits per second (Mbps) full-duplex or half-duplex (half-duplex is the default). The I/O controller without the Fast Ethernet port is shown in Figure 1-9.

Note When you use the I/O controller that is equipped with an MII port and an RJ-45 port, only one port can be configured for use at a time. Although still supported by Cisco Systems, the I/O controller equipped with the single MII port was discontinued as an orderable product in May 1998.

- NVRAM for storing the system configuration and environmental monitoring logs. NVRAM uses lithium batteries to maintain its contents when disconnected from power.
- Flash memory SIMM for storing the boot helper image.
- Two PCMCIA slots for Flash Disks or Flash memory cards, which contain the default Cisco IOS software image.
- Boot ROM for storing sufficient code for booting the Cisco IOS software.
- Two environmental sensors for monitoring the cooling air as it enters and leaves the Cisco 7204 chassis.

Figure 1-7 I/O Controller—with Fast Ethernet Port (Single MII Port)

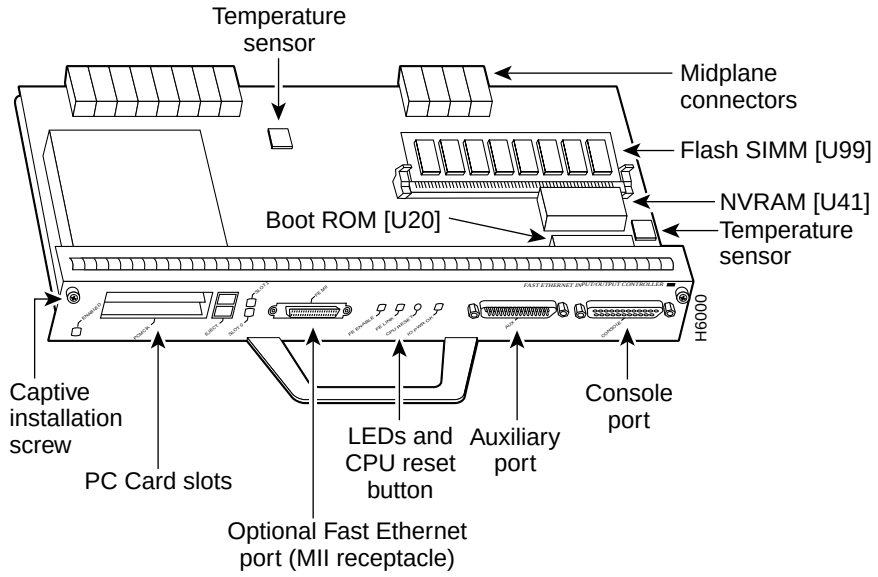


Figure 1-8 I/O Controller—with Fast Ethernet Port (MII and RJ-45 Ports)

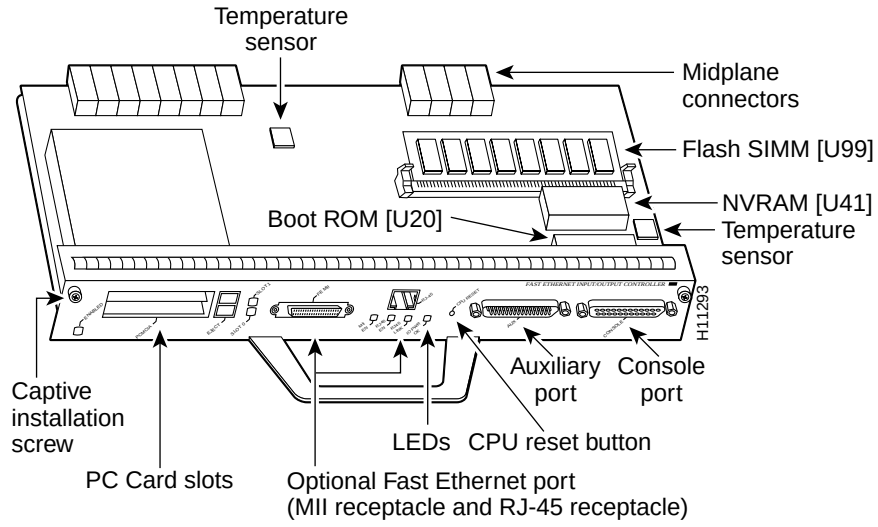


Figure 1-9 I/O Controller—without Fast Ethernet Port

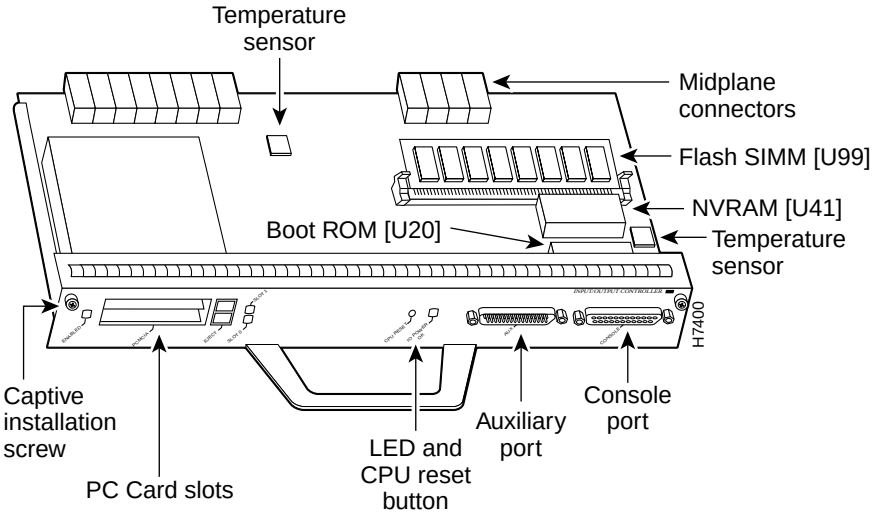


Table 1-3 lists the I/O controller memory components.

Table 1-4 I/O Controller Memory Components

Memory Type	Size	Quantity	Description	Location
Boot ROM	256 KB	1	DIP-type integrated circuit for the ROM monitor program	U20
Flash SIMM	4 MB	1	Contains the default boot helper image	U99
Flash memory card	8 to 20 MB	Up to 2	Contains the default Cisco IOS image	PCMCIA slot 0 and slot 1
NVRAM	128 KB	1	Nonvolatile EPROM for the system configuration file	U41

Depending on whether the Fast Ethernet port is present, up to five LEDs on the I/O controller faceplate indicate system status; two additional LEDs indicate the status of the Flash memory cards installed in either PCMCIA slot.

Figure 1-10 shows the LEDs on the I/O controller with the Fast Ethernet port that is equipped with a single MII port. Figure 1-11 shows the LEDs on the I/O controller with the Fast Ethernet port that is equipped with an MII port and an RJ-45 port. Figure 1-12 shows the LEDs on the I/O controller without the Fast Ethernet port. Table 1-5 lists I/O controller LEDs and their functions. To use the LEDs for troubleshooting the I/O controller, refer to the "Identifying Startup Problems" section on page 5-3 in "Chapter 5, "Troubleshooting the Installation."."

A CPU reset button is located next to the IO power OK LED or the auxiliary port on the I/O controller faceplate. The CPU reset button resets the entire system.

Caution To prevent system errors and problems, use the CPU reset button only at the direction of your service representative.

Figure 1-10 I/O Controller LEDs and CPU Reset Button—with Fast Ethernet Port (Single MII Port)

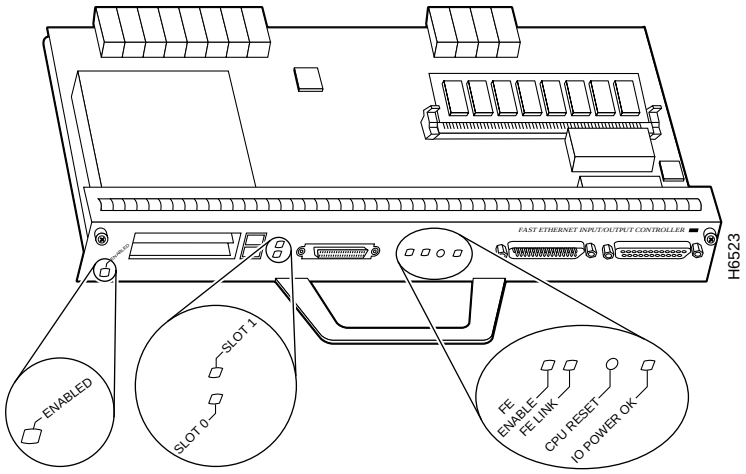


Figure 1-11 I/O Controller LEDs and CPU Reset Button—with Fast Ethernet Port (MII and RJ-45 Ports)

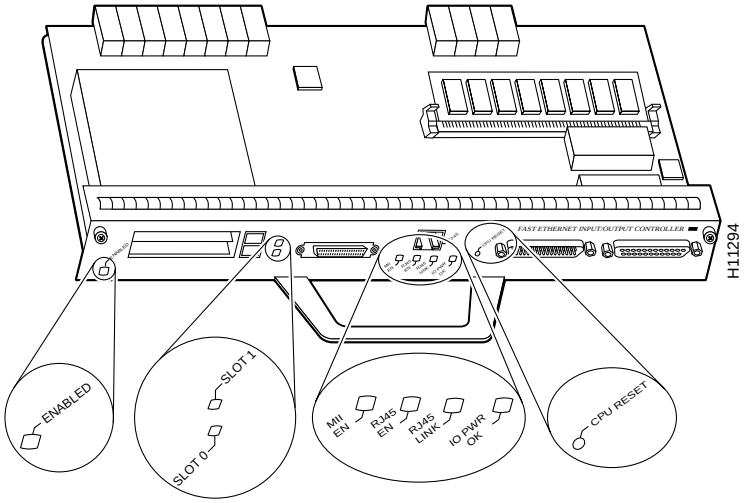
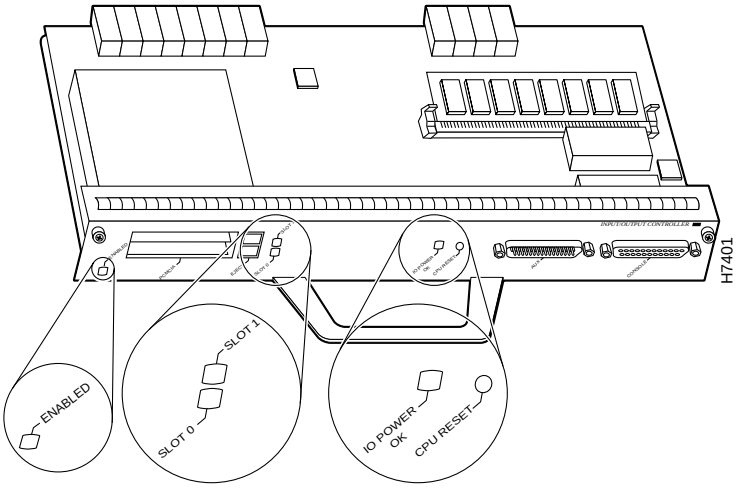


Figure 1-12 I/O Controller LEDs and CPU Reset Button—without Fast Ethernet Port



I

Table 1-5 I/O Controller LEDs

LED	Function
IO Power OK	Indicates that the I/O controller is on and receiving DC power from the router midplane. This LED comes on during a successful router boot and remains on during normal operation of the router.
Enabled	Indicates that the network processing engine and the I/O controller are enabled for operation by the system; however, it does not mean that the Fast Ethernet port on the I/O controller is functional or enabled. This LED comes on during a successful router boot and remains on during normal operation of the router.
FE Enable	Indicates that the Fast Ethernet port on the I/O controller is initialized and enabled for operation by the system. This LED comes on after the I/O controller has been enabled and remains on during normal operation of the router.
FE Link	Indicates that the Fast Ethernet port on the I/O controller has established a valid link with the network. This LED remains off during normal operation of the router, unless there is an incoming carrier signal.
MII EN	Indicates that the Fast Ethernet port's MII ports is initialized and enabled by the system, and configured for operation. This LED comes on after the I/O controller has been enabled and the MII port has been configured as the media type for the Fast Ethernet port (the RJ-45 port is the default media type for the Fast Ethernet port). This LED remains on during normal operation of the router.
RJ45 EN	Indicates that the Fast Ethernet port's RJ-45 port (the default media type for the Fast Ethernet port) is initialized and enabled by the system. This LED comes on after the I/O controller has been enabled and remains on during normal operation of the router.

Table 1-5 I/O Controller LEDs (continued)

LED	Function
RJ45 LINK	Indicates that the Fast Ethernet port's RJ-45 port has established a valid link with the network. This LED remains off during normal operation of the router, unless there is an incoming carrier signal.
Slot 0 Slot 1	Goes on to indicate which PCMCIA slot is in use when either slot is being accessed by the system. These LEDs remain off during normal operation of the router.

Note The I/O controller without the Fast Ethernet port does not have the FE enabled LED and the FE link LED. The I/O controller without the Fast Ethernet port and the I/O controller that is equipped with a single MII port do not have the MII enabled, RJ-45 enabled, and RJ-45 link LEDs.

Note An MII LINK LED is not provided on the I/O controller because the LED is provided on external transceivers that are required for connecting to the MII port on the I/O controller. Refer to the section "Fast Ethernet Connection Equipment" section on page 3-16 inChapter 3, "Installing the Cisco 7204" for Fast Ethernet MII connection requirements.

Use the **show diag 0** command to identify the I/O controller (with or without the Fast Ethernet port) installed in your Cisco 7204 router.

Note Slot 0 in Cisco 7200 series routers is always reserved for the Fast Ethernet port on the I/O controller—if present. If the I/O controller without the Fast Ethernet port is installed in your Cisco 7200 series router, the system software will not display output for the **show diag 0** command.

Note Refer to the section """Port Adapter Slot and Logical Interface Numbering" section on page 1-23 for information about port adapter slot numbering and logical interface numbering for the Cisco 7204 router.

The following sample output from the show diag 0 command is from a Cisco 7204 I/O controller with the Fast Ethernet port that is equipped with an MII port and RJ-45 port:

```
Router> show diag 0
Slot 0:
        Fast-ethernet on C7200 I/O with MII or RJ45 port adapter, 1 port
        Port adapter is analyzed
        Port adapter insertion time 00:10:42 ago
        Hardware revision 2.0           Board revision A0
        Serial number     3511336       Part number    73-1537-03
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 14 02 00 00 35 94 28 49 06 01 03 00 00 00 00
          0x30: 50 0000 00 FF FF FF FF FF FF FF FF FF FF FF FF
```

The RJ-45 port is the default media type for the I/O controller that is equipped with an MII port and an RJ-45 port. Use the **media-type** command to change the I/O controller's media type and the **show interfaces** command to verify the change. The following example configures the MII port as the media type for the I/O controller:

```
Router# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# int fastethernet 0/0
Router(config-if)# media-type mii
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
%LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up

Router# sh int fastethernet 0/0
FastEthernet0/0 is administratively up, line protocol is up

  (display text omitted)

  Encapsulation ARPA, loopback not set, keepalive not set, hdx, MII

  (display text omitted)
```

Use the **media-type 100X** command to return the media type to the RJ-45 port.

The default transmission mode for the Fast Ethernet port on the I/O controller is half-duplex. Use the **full-duplex** command to change the Fast Ethernet port's transmission mode and the **show interfaces** command to verify the change as follows:

```
Router# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# int fastethernet 0/0
Router(config-if)# full-duplex
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
%LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up

Router# sh int fastethernet 0/0
FastEthernet0/0 is administratively up, line protocol is up

  (display text omitted)

  Encapsulation ARPA, loopback not set, keepalive not set, fdx, 100BaseTX

  (display text omitted)
```

Use the **no full-duplex** command to return the Fast Ethernet port on the I/O controller to half-duplex transmission mode.

Port Adapters and Service Adapters

The Cisco 7204 is shipped from the factory with up to four installed port adapters and service adapters. Port adapters provide a variety of network media types (based on your order) for the router and service adapters provide hardware-based services (such as data compression and encryption) for the port adapter media types. The port and service adapters connect directly to the router's midplane. Port and service adapters installed in the Cisco 7204 router support OIR.

For a description of OIR, refer to "Online Insertion and Removal" section on page 1-25. For general instructions about how to replace a port or service adapter, refer to the section "Replacing a Port Adapter or Service Adapter" section on page 6-3 in "Chapter 6, "Maintaining the Cisco 7204."

Caution To ensure adequate airflow across the router's port adapters, a port adapter or a blank port adapter must be installed in each port adapter slot.

Note Detailed instructions for removing, replacing, and configuring the port and service adapter types supported by the Cisco 7206 are contained in the configuration note for each port and service adapter. For example, if you plan to replace a PA-A3 enhanced ATM port adapter in your Cisco 7206 router, *PA-A3 Enhanced ATM Port Adapter Installation and Configuration*. This document is available on Cisco.com.

Power Supplies

The Cisco 7204 comes equipped with one 280W AC-input power supply or one 280W DC-input power supply. You must order the second power supply separately.

Caution Do not mix power supplies in the Cisco 7204. In dual power supply configurations, both power supplies *must* be of the same type (two AC-input power supplies or two DC-input power supplies).

Note Detailed instructions for handling and replacing the Cisco 7204 power supplies are contained in the configuration notes *280-Watt AC-Input Power Supply Replacement Instructions* and *280-Watt DC-Input Power Supply Replacement Instructions*. This document is available on Cisco.com.

A handle on the AC and DC power supplies provides a grip point for removing and replacing the power supply. (Figure 1-13 shows the faceplate of the AC-input power supply. Figure 1-14 shows the faceplate of the DC-input power supply.) Two captive installation screws secure the power supply to the chassis and seat the power supply in the router midplane. A power OK LED indicates that the power supply is delivering +5 VDC to the router midplane.

The AC-input power supply has a receptacle for an AC-input power cable. A modular power cable connects the AC-input power supply to the site AC power source. A cable-retention clip secures the power cable to the AC-input power supply.

The DC-input power supply has DC-input power leads that are hardwired to a DC-input terminal block. A cable tie is shipped with each DC-input power supply to secure the leads to the power supply faceplate and provide strain relief for the leads.

Figure 1-13 AC-Input Power Supply

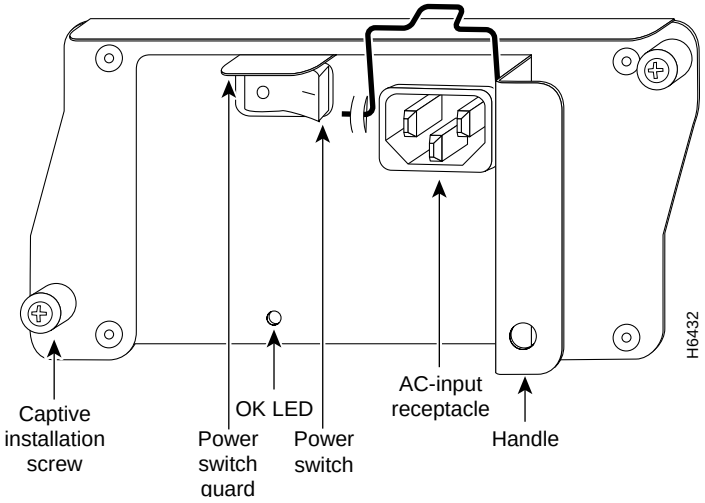
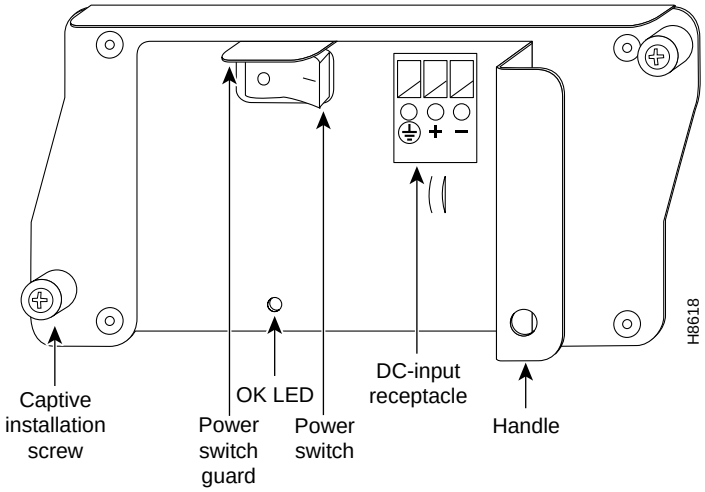


Figure 1-14 DC-Input Power Supply



Caution To ensure adequate airflow across the router's power supplies, a power supply or a power supply filler plate must be installed in each power supply bay. Figure 1-13 shows a Cisco 7204 with an installed power supply filler plate.

Table 1-1 lists the AC-input and DC-input power supply system power specifications, including input voltage and operating frequency ranges.

Note 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.

Note Each DC-input power supply operating at –48 VDC in North America requires a minimum of 13A service. Each DC-input power supply operating at –60 VDC in the European Community requires a minimum of 8A service.

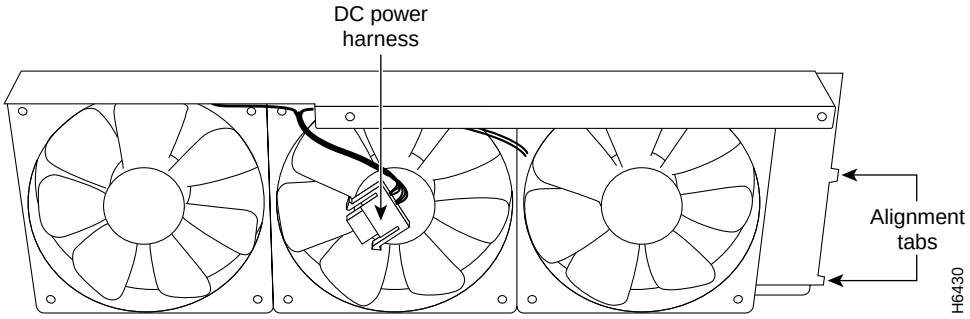
This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a listed and certified fuse or circuit breaker, 20A minimum 60 VDC, is used on all current-carrying conductors.

The power OK LED goes off and the power supply will shut itself down when the internal DC voltages exceed allowable tolerances or the internal temperature of the power supply exceeds allowable tolerances. The power supply will remain in a shut down state until it is disconnected and reconnected to the source power, and then restarted with the power switch. The power switch turns the power supply on and starts the system. For a description of power-supply shutdown conditions and thresholds, refer to the "“Environmental Monitoring and Reporting Functions” section on page 1-26".

Fan Tray

The fan tray, shown in Figure 1-15, consists of three fans that are enclosed in a metal case. The fan tray is located in the subchassis and receives –12 VDC through a DC power harness that connects directly to the router midplane. You must remove the subchassis to access the fan tray.

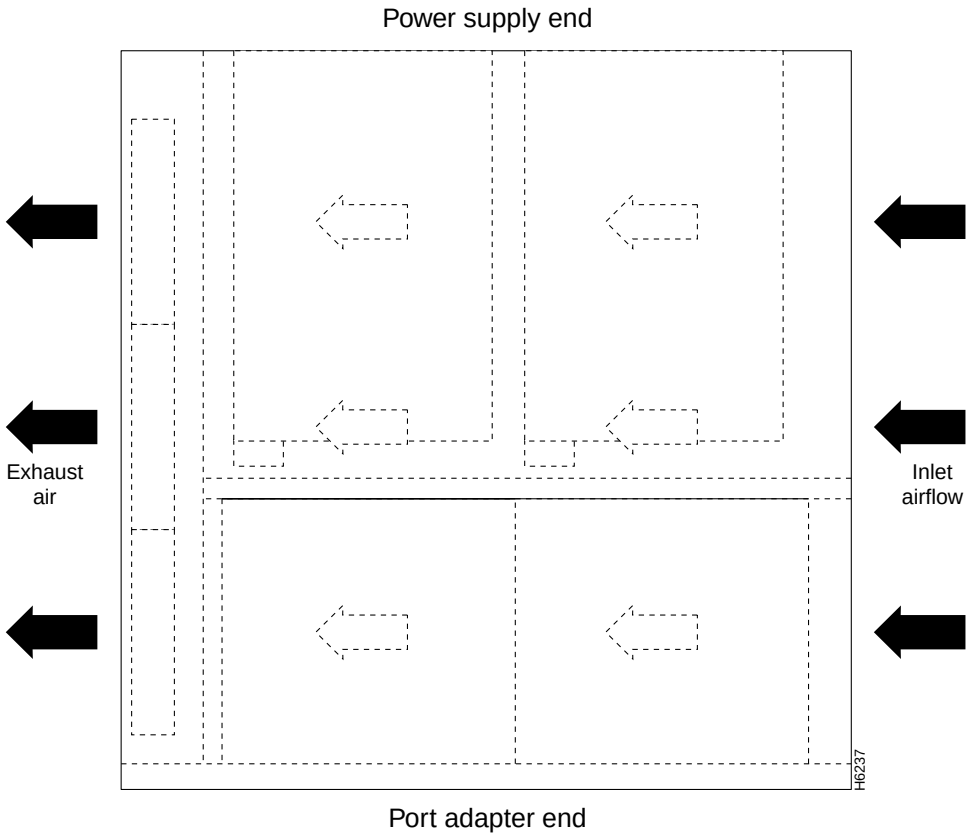
Figure 1-15 Cisco 7204 Fan Tray



The fan tray draws cooling air in through the intake vent on the right side of the chassis (when viewing the router from the front), and moves the air across the internal components and out the exhaust vent on the left side of the chassis.

Figure 1-16 shows the air flow through the router.

Figure 1-16 Internal Air Flow—Top View



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 three inches of clearance. (See the "Site Requirements" section on page 2-4 in the chapter Chapter 2, "Preparing for Installation.")

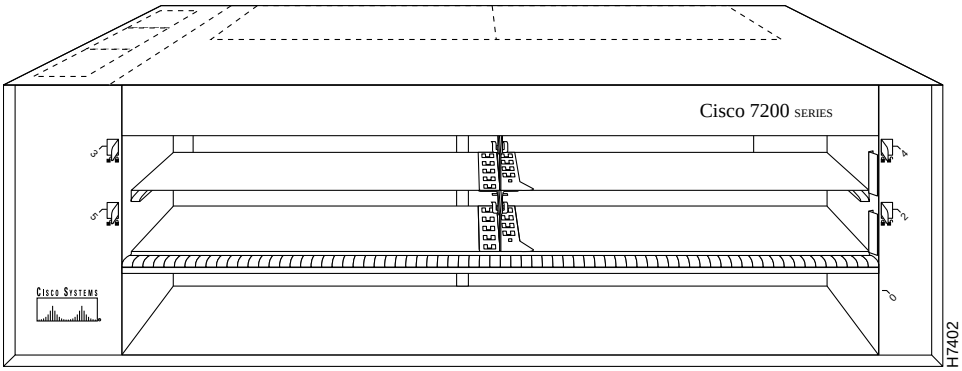
Temperature sensors on the network processing engine and I/O controller monitor the internal air temperature and send warning messages when the internal air temperature approaches a specified threshold. If the internal temperature exceeds the specified threshold, the system environmental monitor shuts down all internal power to prevent equipment damage from excessive heat.

Chassis

The Cisco 7204 chassis, shown in Figure 1-17, has four slots for the port adapters, one slot for the I/O controller, and one bay for the subchassis. To replace the chassis, you must remove all of the internal components, including the subchassis.

Note Because you must remove all the internal components when replacing the chassis, refer to the configuration notes that explain how to remove and replace the internal components. These documents are available on Cisco.com.

Figure 1-17 Cisco 7204 Chassis



PCMCIA Flash Disks and Flash Memory Cards

The Cisco 7204 supports up to two installed PCMCIA Flash Disks or two Flash memory cards.

Note To avoid potential problems when inserting spare Flash Disks or Flash memory cards in your Cisco 7204, we recommend that you reformat all of your Flash Disks or Flash memory cards on a Cisco 7204 running one of the recommended Cisco IOS software releases. The chapter Chapter 6, "Maintaining the Cisco 7204" contains instructions that explain how to reformat a Flash memory card.

Flash memory (Flash Disks or cards and the Flash SIMM on the I/O controller) allows you to remotely load and store multiple system and boot helper images. You can download a new image over the network and then add the new image to Flash memory or replace existing files. You can also transfer images between Flash Disks or cards and the onboard Flash memory SIMM. You can then boot the router either manually or automatically from any of the stored images. Flash memory can also function as a TFTP server to allow other routers to boot remotely from stored images or copy them into their own Flash memory.

Note For procedures that explain the use of the PCMCIA Flash Disk, refer to the *Using the Flash Disk* document .

For procedures that explain how to replace main, Flash, and ROM monitor memory in Cisco 7200 series routers, refer to the *Memory Replacement Instructions for the Network Processing Engine and Input/Output Controller* document.

The preceding documents are available on Cisco.com. Instructions for installing and removing a Flash memory card are also contained in the "Installing and Removing a Flash Memory Card" section on page 6-7 in Chapter 6, "Maintaining the Cisco 7204" of this guide.

Table 1-6 lists the Flash memory card options supported by the Cisco 7204.

Table 1-6 Flash Memory Card Options

Memory Size	Product Number
16 MB	MEM-I/O-FLC16M[1]
20 MB	MEM-I/O-FLC20M[1]

1. These products are also available as Flash card upgrades. To order an upgrade, add an equal sign (=) after the product number, for example, MEM-I/O-FLC16M=.

Table 1-7 lists the Flash Disk options supported by the Cisco 7204.

Table 1-7 Flash Disk Options

Memory Size	Product Number
40 MB	MEM-I/O-FLD40M[1]
110 MB	MEM-I/O-FLD110M[1]

1. These products are also available as Flash Disk upgrades. To order an upgrade, add an equal sign (=) after the product number, for example, MEM-I/O-FLD110M=.

Rack-Mount and Cable-Management Kit

The rack-mount and cable-management kit for the Cisco 7204 consists of rack-mount and cable-management brackets that are designed for mounting your router in 19-inch, 4-post or 2-post equipment racks and for relieving strain on port adapter interface cables that are installed on port adapters in the router. The kit is shipped with each Cisco 7204 and is also available as a single FRU.

For detailed instructions about how to install the rack-mount and cable-management brackets on your Cisco 7204, refer to the "Rack-Mounting the Cisco 7204" section on page 3-1" and the "General Installation" section on page 3-9" in Chapter 3, "Installing the Cisco 7204."

Functional Overview

This section provides a functional overview of the Cisco 7204. It describes the numbering and addressing of the port adapters for the router, the environmental monitoring and reporting functions, and online insertion and removal (OIR). These descriptions will help you become familiar with the capabilities of the Cisco 7204 router.

Port Adapter Slot and Logical Interface Numbering

In the Cisco 7204, the port adapter slot number is the chassis slot in which a port or service adapter is installed, while the logical interface number is the physical location of the interface port on a port adapter (service adapters do not have interface ports). Port adapter slots are numbered from 1 through 4; port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller—if present. (Refer to Figure 1-2 for the numbering scheme of the port adapter slots.) The number of logical interfaces depends on the type of port adapter.

The *Media Access Control (MAC)* or *hardware* address is a standardized data link layer address that is required for certain network interface types. These addresses are not used by other devices in the network; they are specific and unique to each port. The Cisco 7204 uses a specific method to assign and control the MAC addresses of its port adapters. For a description of the MAC-layer address, see the section "MAC Address" section on page 1-25 in this chapter.

Port adapter slots maintain the same slot number regardless of whether other port or service adapters are installed or removed. However, when you move a port adapter to a different slot, the port adapter's slot number changes to reflect the new slot number.

You can identify port adapter slots by using software commands to display information about a specific port or service adapter or for all port and service adapters in the Cisco 7204. To display information about all port adapter slots, use the **show interfaces** command. To display information about a specific port adapter slot, use the **show interfaces** command with the port adapter type and slot number in the format **show interfaces** (*port adapter type* and *slot number*/*port number*). If you abbreviate the command (**sh int**) and do not specify port adapter type and slot number (or arguments), the system interprets the command as **show interfaces** and displays the status of all port adapters and ports.

Following is an example of how the **show interfaces** command, used without arguments, displays status information (including the physical port adapter number) for each port adapter in a Cisco 7204.

In the following example, most of the status information for each interface is omitted.

```
Router# sh int

FastEthernet0/0 is administratively up, line protocol is up
    Hardware is DEC21140, address is 0000.0000.0000 (bia 0000.0000.0000)
    Internet address is 1.1.1.3
    MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
    (display text omitted)
Fddi1/0 is administratively down, line protocol is down
    Hardware is MIF68840_MM, address is 0000.0000.0000 (bia 0000.0000.0000)
    Internet address is 1.1.1.0
    MTU 4470 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
    (display text omitted)
Ethernet2/0 is administratively up, line protocol is up
    Hardware is AmdP2, address is 0000.0000.0000 (bia 0000.0000.0000)
    Internet address is 1.1.1.7
    MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
    (display text omitted)
```

You can also use arguments such as the interface type (Ethernet, TokenRing, Fddi, and so forth) and the port address (slot/port) to display information about a specific interface only.

The following example shows the display for the first port on the Token Ring port adapter in port adapter slot 3:

```
Router# sh int tokenring 3/0

TokenRing3/0 is administratively down, line protocol is down
    Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
    Internet address is 1.1.1.8
    MTU 4464 bytes, BW 1600 Kbit, DLY 630 usec, rely 255/255, load 1/255
    Encapsulation SNAP, loopback not set, keepalive set (10 sec)
    ARP type: SNAP, ARP Timeout 04:00:00
    Ring speed: 16 Mbps
    (display text omitted)
```

For complete descriptions and instructions for the commands used to configure your Cisco 7204, refer to the *Configuration Fundamentals Configuration Guide* and *Configuration Fundamentals Command Reference* publications, which are available on Cisco.com.

MAC Address

LAN interfaces (ports) require unique MAC addresses, also known as *hardware* addresses. Typically, the MAC address of an interface is stored on a memory component that resides directly on the interface circuitry; however, the OIR feature requires a different method. For a description of OIR, refer to the section "“Online Insertion and Removal” section on page 1-25".

The OIR feature allows you to remove a port or service adapter and replace it with another identically configured one. If the new port or service adapter matches the adapter you removed, the system immediately brings it on line. In order to allow OIR, an address allocator with a unique MAC addresses is stored in an EEPROM on the router midplane. Each address is reserved for a specific port and slot in the router regardless of whether a port or service adapter resides in that slot. The MAC addresses are assigned to the slots in sequence. The first address is assigned to slot 0, and the last address is assigned to slot 6. This address scheme allows you to remove port and service adapters and insert them into other routers without causing the MAC addresses to move around the network or be assigned to multiple devices.

Note that if the MAC addresses were stored on each port or service adapter, OIR would not function because you could never replace one adapter with an identical one; the MAC addresses would always be different. Also, each time a port or service adapter was replaced, other devices on the network would have to update their data structures with the new address, and, if they did not do so quickly enough, could cause the same MAC address to appear in more than one device at the same time.

Note Storing the MAC addresses for every slot in one central location means the addresses stay with the memory device on which they are stored.

Online Insertion and Removal

All port and service adapters in the Cisco 7204 support online insertion and removal (OIR).This function allows you to install and replace port and service adapters while the router is operating; you do not need to notify the software or shut down the system power. This provides a method that is seamless to end users on the network, maintains all routing information, and ensures session preservation.

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a port or service adapter in a Cisco 7204 router, refer to the configuration note that was shipped with the port or service adapter hardware.

Caution The network processing engine and the I/O controller are required system components that cannot be removed if the router is operating. Removing the network processing engine or the I/O controller while the router is operating will cause the router to shut down or crash, and might damage or destroy memory files.

Each port and service adapter has a bus connector that connects it to the router's midplane. Each midplane connector has a set of tiered pins in three lengths that send specific signals to the system as they make contact with the port adapter. The system assesses the signals it receives and the order in which it receives them to determine if a port or service adapter is being removed or inserted into the midplane. From these signals, the system determines whether to reinitialize a new interface or shut down a removed interface. For example, when inserting an port adapter, the longest pins make contact with the port adapter first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them.

When you remove or insert a port or service adapter in a Cisco 7204 router, the midplane pins send signals to notify the system, which then performs as follows:

1. Rapidly scans the midplane for configuration changes.
2. Initializes all newly inserted port and service adapters, noting any removed port adapter interfaces and placing them in the administratively shut down state.
3. Brings all previously configured interfaces on the port adapter back to the state they were in when they were removed (service adapters do not have interfaces). Any newly inserted interfaces are put in the administratively shut down state, as if they were present (but not configured) at boot time. If a similar port adapter type is reinserted into a slot, its ports are configured and brought on line up to the port count of the original port adapter.

Environmental Monitoring and Reporting Functions

Environmental monitoring and reporting functions are controlled by the network processing engine and allow you to maintain normal system operation by identifying and resolving adverse conditions prior to loss of operation. The environmental monitoring functions constantly monitor the internal chassis air temperature and DC supply voltages and currents. Each power supply monitors its own voltage and temperature and shuts itself down if it detects a critical condition within the power supply. If conditions reach shutdown thresholds, the system shuts down to avoid equipment damage from excessive heat. The reporting functions periodically log the values of measured parameters so that you can retrieve them for analysis later, and the reporting functions display warnings on the console if any of the monitored parameters exceed defined thresholds.

Environmental Monitoring

The environmental monitoring functions use four sensors, two on the network processing engine and two on the I/O controller, to monitor the temperature of the cooling air as it moves through the chassis. Table 1-8 lists the temperature thresholds for the processor-monitored levels of a Cisco 7204 router that has an installed NPE-100, NPE-150, or NPE-200.

Note Refer to the *Cisco 7200 VXR Installation and Configuration Guide* publication for the temperature thresholds and processor-monitored levels of a Cisco 7200 VXR router that has an installed NPE-300. The Cisco 7204 does not support the NPE-300.

Table 1-8 Typical Processor-Monitored Temperature Thresholds (NPE-100, NPE-150, and NPE-200)

Parameter	High Warning	High Critical	Shutdown
NPE-100 or NPE-200			
Chassis inlet	104°F (40°C)	122°F (50°C)	–
Chassis outlet 1	109°F (43°C)	127°F (53°C)	136°F (58°C)
Chassis outlet 2	167°F (75°C)	167°F (75°C)	–
Chassis outlet 3	122°F (50°C)	140°F (60°C)	149°F (65°C)
NPE-150			
Chassis inlet	104°F (40°C)	122°F (50°C)	–

Table 1-8 Typical Processor-Monitored Temperature Thresholds (NPE-100, NPE-150, and NPE-200) (continued)

Parameter	High Warning	High Critical	Shutdown
Chassis outlet 1	109°F (43°C)	127°F (53°C)	136°F (58°C)
Chassis outlet 2	167°F (75°C)	167°F (75°C)	–
Chassis outlet 3	131°F (55°C)	149°F (65°C)	158°F (70°C)

Table 1-9 lists the DC power thresholds for the normal, warning, and critical (power supply-monitored) levels.

- Normal—All monitored parameters are within normal tolerances.
- Warning—The system has exceeded a specified threshold. The system will continue to operate, but operator action is recommended to bring the system back to a normal state.
- Critical—An out-of-tolerance temperature or voltage condition exists. The system will continue to operate; however, the system is approaching shutdown. Immediate operator action is required.
- Shutdown—The processor has detected a temperature condition that could result in physical damage to system components and has disabled DC power to all internal components. Requires immediate operator action. All DC power will remain disabled until you toggle the power switch. Before any shutdown, the system logs the status of monitored parameters in NVRAM so you can retrieve it later to help determine the cause of the problem.
- Power supply shutdown—The power supply detected an internal out-of-tolerance overvoltage, overcurrent, or temperature condition and shut itself down. All DC power will remain disabled until you toggle the power switch.

Table 1-9 Typical Power Supply-Monitored DC-Voltage Thresholds

Parameter	Low Critical	Low Warning	High Warning	High Critical
+3.45V	+3.26V	+3.34V	+3.55V	+3.63V
+5.15V	+4.86V	+4.99V	+5.31V	+5.43V
+12.15V	+11.39V	+11.67	+12.62V	+12.91V
–11.95V	–9.52V	–10.73	–13.16V	–14.38V

If the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal and, if the temperature exceeds the shutdown threshold, it shuts down the system. The system stores the present parameter measurements for both temperature and DC voltage in NVRAM, so that you can retrieve them later as a report of the last shutdown parameters.

The power supplies monitor internal power supply temperature and voltages. A power supply is either within tolerance or out of tolerance (Critical), as shown in Table 1-9. If an internal power supply temperature or voltage reaches a critical level, the power supply shuts down without any interaction with the system processor.

Reporting Functions

The Cisco 7204 displays warning messages on the console if chassis interface-monitored parameters exceed a defined threshold. You can also retrieve and display environmental status reports with the **show environment**, **show environment all**, **show environment last,** and **show environment table** commands. Parameters are measured and reporting functions are updated every 60 seconds. A brief description of each of these commands follows.

Note Refer to the *Cisco 7200 VXR Installation and Configuration Guide* publication for sample outputs of the **show environment**, **show environment all**, **show environment last**, and **show environment table** commands from a Cisco 7200 VXR router that has an installed NPE-300. The Cisco 7204 does not support the NPE-300.

Caution To prevent overheating the chassis, ensure that your system is drawing cool inlet air. Overtemperature conditions can occur if the system is drawing in the exhaust air of other equipment. Ensure adequate clearance around the sides of the chassis so that cooling air can flow through the chassis interior unimpeded and exhaust air exits the chassis and is not drawn into the inlet vent of other device.

The **show environment** command display reports the current environmental status of the system. The report displays parameters that are out of the normal values. No parameters are displayed if the system status is normal. The example that follows shows the display for a system in which all monitored parameters are within normal range:

```
Router# show envAll measured values are normal
```

If the environmental status is *not* normal, the system reports the worst-case status level. Following is an example overvoltage warning:

```
Router# show envWarning: +3.45 V measured at +3.83 V
```

The **show environment last** command retrieves and displays the NVRAM log, which shows the reason for the last system shutdown (if the shutdown was related to voltage or temperature) and the environmental status at that time. Air temperature is measured and displayed, and the DC voltage supplied by the power supply is also displayed.

Following is sample output of the **show env last** command:

```
Router# show env last

Temperature readings:
    chassis inlet previously measured at 27C/80F
    chassis outlet 1 previously measured at 31C/87F
    chassis outlet 2 previously measured at 37C/98F
    chassis outlet 3 previously measured at 45C/113F

Voltage readings:
    +3.45 V previously measured at +3.51 V
    +5.2 V  previously measured at +5.19 V
    +12.2 V previously measured at +12.42 V
    -12.2 V previously measured at -12.14 V


Reason for last shutdown:
    power supply
```

The **show environment table** command displays the temperature and voltage thresholds for each temperature sensor and for each monitored status level, which are related to those thresholds listed in Table 1-8 and Table 1-9. The display also lists the shutdown threshold for the system.

Following is sample output of the **show env table** command for a Cisco 7204 that has an installed NPE-150:

```
Router# show env table

Sample Point      LowCritical    LowWarning     HighWarning    HighCritical
chassis inlet                                   40C/104F       50C/122F
chassis outlet 1                                43C/109F       53C/127F
chassis outlet 2                                75C/167F       75C/167F
chassis outlet 3                                55C/131F       65C/149F
+3.45 V           +3.26          +3.34          +3.55          +3.63
+5.15 V           +4.86          +4.99          +5.31          +5.43
+12.15 V          +11.39         +11.67         +12.62         +12.91
-11.95 V          -9.52          -10.73         -13.16         -14.38
System shutdown for chassis outlet 1 58C/136F
System shutdown for chassis outlet 3 70C/158F
```

Following is sample output of the **show env table** command for a Cisco 7204 that has an installed NPE-100 or NPE-200:

```
Router# show env table

Sample Point      LowCritical    LowWarning     HighWarning    HighCritical
chassis inlet                                   40C/104F       50C/122F
chassis outlet 1                                43C/109F       53C/127F
chassis outlet 2                                75C/167F       75C/167F
chassis outlet 3                                50C/122F       60C/140F
+3.45 V           +3.26          +3.34          +3.55          +3.63
+5.15 V           +4.86          +4.99          +5.31          +5.43
+12.15 V          +11.39         +11.67         +12.62         +12.91
-11.95 V          -9.52          -10.73         -13.16         -14.38
System shutdown for chassis outlet 1 58C/136F
System shutdown for chassis outlet 3 65C/149F
```

Note Temperature ranges and values are subject to change.

The **show environment all** command displays an extended report that includes temperature readings and voltage readings. The **show environment all** command also displays a report showing which power supply slots are occupied and which are empty.

Following is sample output of the **show env all** command:

```
Router# show env all

Power Supplies:
    Power supply 1 is Zytek AC Power Supply. Unit is on.
    Power supply 2 is Zytek AC Power Supply. Unit is on.

Temperature readings:
    chassis inlet    measured at 47C/116F:Temperature in Warning range!
    chassis outlet 1 measured at 49C/120F:Temperature in Warning range!
    chassis outlet 2 measured at 55C/131F
    chassis outlet 3 measured at 58C/136F:Temperature in Warning range!

Voltage readings:
    +3.45 V  measured at +3.51 V
    +5.2 V  measured at +5.19 V
    +12.2 V measured at +12.42 V
    -12.2 V measured at -12.14 V
```

Fan Failures

When the system power is on, all three fans should be operational. The system will continue to operate if a fan fails; however, if the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal and, if the temperature exceeds the shut down threshold, it shuts down the system.

If the system does shutdown because the temperature exceeded the shutdown threshold, the system will display the following message on the console screen and in the environment display when the system restarts:

```
Queued messages:
%ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown
```

For complete descriptions and instructions of the environmental monitor commands, refer to the *Configuration Fundamentals Configuration Guide* and *Configuration Fundamentals Command Reference* publications, which are available on Cisco.com.