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# Packet OC-3 Interface Processor (POSIP) Installation and Configuration

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**Product Numbers: POSIP-OC3-20-SM=, POSIP-OC3-20-MM=, POSIP-OC3-40-SM(=), POSIP-OC3-40-MM(=), and MEM-POSIP-64MB=**

This publication contains instructions for installing and configuring the Packet OC-3 Interface Processor (POSIP), which is a fixed-configuration interface processor that uses second-generation Versatile Interface Processor (VIP2) technology. The POSIP complies with the Packet-Over-SONET specification.

This publication contains basic configuration steps and examples and includes the procedures for upgrading memory on the POSIP. The POSIP is compatible with any Cisco 7500 series router or any Cisco 7000 series router that is using a Route Switch Processor-based system processor card.

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**Note** For specific POSIP hardware and software prerequisites, refer to the sections “POSIP Hardware Requirements,” on page 11, and “POSIP Software Requirements” on page 12. The entire POSIP assembly is a field replaceable unit (FRU); the POS dual-width port adapter is *not* a FRU.

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### Corporate Headquarters

Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA

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## If You Need More Information

The Cisco IOS software running your router contains extensive features and functionality. For information on Cisco IOS software and for general installation and maintenance information for your router, use the following resources:

- Cisco Documentation CD-ROM package  

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly; therefore, it might be more up to date than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription.
- For Cisco IOS software configuration information and support, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software installed on your Cisco hardware. You can also refer to the Cisco IOS software release notes for the version of software you are using on your hardware.
- For hardware installation and maintenance information on the Cisco 7500 series routers, refer to the *Cisco 7500 Series Installation and Configuration Guide* that shipped with your Cisco 7500 series router.
- For hardware installation and maintenance information on the Cisco 7000 series routers, refer to the *Cisco 7000 Hardware Installation and Maintenance* manual and the *Cisco 7000 User Guide*, or to the *Cisco 7010 Hardware Installation and Maintenance* manual and the *Cisco 7010 User Guide*, which shipped with your Cisco 7000 or Cisco 7010 router, respectively.

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**Note** You can access Cisco IOS software documentation and hardware installation and maintenance documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, <http://www-europe.cisco.com>.

If you are reading Cisco documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** on the toolbar, and then select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

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- To view Cisco documentation or obtain general information about documentation, refer to the following sources:
  - Documentation CD-ROM.
  - Cisco Connection Online (CCO). (Refer to the section “Cisco Connection Online,” on page 45.)
  - Customer Service at 800 553-6387 or 408 526-7208. Customer Service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding company holidays). You can also send e-mail to [cs-rep@cisco.com](mailto:cs-rep@cisco.com).
  - The *Cisco Information Packet* that shipped with your router.

## Packet-Over-SONET Terms and Acronyms

The following are common POSIP terms and acronyms for your reference:

- ITU-T—International Telecommunications Union Telecommunication Sector (formerly the Consultative Committee for International Telegraph and Telephone [CCITT])
- MIB—Management Information Base.
- PPP—Point-to-Point Protocol, which provides a standard encapsulation method for transporting multi-protocol datagrams over point-to-point links.
- SDH—Synchronous Digital Hierarchy. International standard for optical digital transmission at hierarchical rates from 155.520 Mbps (STM-1) to 2.5 gigabits per second (Gbps) (STM-16) and greater.
- SONET—Synchronous Optical Network. An American National Standards Institute (ANSI) standard (T1.1051988) for optical digital transmission at hierarchical rates from 51.840 Mbps (STS-1) to 2.5 Gbps (STS-48) and greater.
- OC-3—Optical Carrier-3 specification for SONET STS-3c and SDH STM-1 transmission rates.
- SPE—Synchronous Payload Envelope; the payload portion of the SONET frame into which the octet-oriented user data is mapped. Octet boundaries are aligned with the SPE octet boundaries.

## Packet-Over-SONET Overview

Point-to-Point Protocol (PPP) was designed as a standard method of communicating over point-to-point links. Initial deployment has been over short local lines, leased lines, and plain-old-telephone-service (POTS) (also called *basic telephone service*) using modems. As new packet services and higher speed lines are introduced, PPP is easily deployed in these environments as well. PPP treats SONET/SDH transport as octet-oriented synchronous links. SONET/SDH links are full duplex by definition. PPP presents an octet interface to the physical layer. There is no provision for suboctets to be supplied or accepted.

The Synchronous Optical Network (SONET) is an octet-synchronous multiplex scheme that defines a family of standard rates and formats. Despite the name, it is not limited to optical links. Electrical specifications have been defined for single-mode fiber, multimode fiber, and CATV 75 ohm coaxial cable; however, the POSIP currently allows only transmission over single-mode and multimode optical fiber. The transmission rates are integral multiples of 51.840 megabits per second (Mbps), which may be used to carry T3/E3 bit-synchronous signals.

The following transmission multiples are currently specified and commonly used, and are expressed in terms of Mbps:

- STS-1—51.840
- STS-3c—155.520 (the POSIP conforms to STS-3c)
- STS-12c—622.080
- STS-48c—2,488.320

The ITU-T defines a series of SDH transmission rates beginning at 155.520 Mbps, as follows:

SONET <sup>1</sup>	SDH equivalent
STS-3c <sup>2</sup>	STM-1 <sup>2</sup>
STS-12c	STM-4c
STS-48c	STM-16c

1. ANSI-defined SONET specifications.
2. Currently supported by the POSIP.

The Packet-Over-SONET specification is primarily concerned with the use of the PPP encapsulation over SONET/SDH links. Since SONET/SDH is by definition a point-to-point circuit, PPP is well suited for use over these links. The octet stream is mapped into the SONET/SDH Synchronous Payload Envelope (SPE), with the octet boundaries aligned with the SPE octet boundaries. The PPP frames are located by row within the SPE payload. Because frames are variable in length, the frames are allowed to cross SPE boundaries.

The basic rate for Packet-Over-SONET is that of STS-3c/STM-1, which is 155.520 Mbps. The available information bandwidth is 149.760 Mbps, which is the STS-3c/STM-1 SPE with section, line, and path overhead removed.

## Packet-Over-SONET and PPP Reference Material

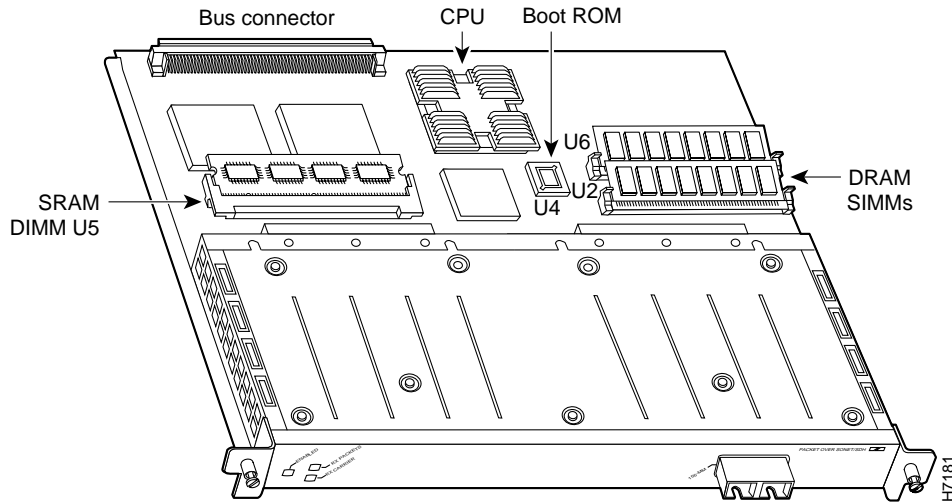
The following references discuss concepts and specifications of Packet-Over-SONET and PPP:

- Simpson, W., Editor, "The Point-to-Point Protocol (PPP)," RFC 1548, Daydreamer, December 1993.
- Simpson, W., Editor, "PPP in HDLC Framing," RFC 1662, Daydreamer, July 1994.
- Simpson, W., Editor, "PPP Over SONET/SDH," RFC1619, May 1995.
- "American National Standard for Telecommunications - Digital Hierarchy - Optical Interface Rates and Formats Specification," ANSI T1.105-1991.
- "American National Standard for Telecommunications - Synchronous Optical Network (SONET) Payload Mappings," ANSI T1.105.02-1993 draft.
- CCITT Recommendation G.707, "Synchronous Digital Hierarchy Bit Rates," June 1992.

# POSIP Description

This section provides a description of the POSIP. The POSIP (see Figure 1 and Figure 2) provides a single 155.520-Mbps, Packet OC-3 network interface for Cisco 7000 series and 7500 series routers.

**Figure 1 Packet-Over-SONET Interface Processor (POSIP)**



**Note** The POSIP is oriented horizontally in the Cisco 7010 and Cisco 7505 and vertically in the Cisco 7000, Cisco 7507, and Cisco 7513.

**Figure 2 POSIP (Faceplate View—Horizontal Orientation)**



Packet data is transported using Point-to-Point Protocol (PPP) and is mapped into the STS-3c/STM-1 frame. The Packet OC-3 interface is compliant with RFC 1619, “PPP over SONET/SDH,” and RFC 1662, “PPP in HDLC-like Framing.” The encapsulations used add approximately half of the number of bytes of transport overhead as that involved with ATM using ATM adaptation layer 5 (AAL5) and line card control (LCC) Subnetwork Access Protocol (SNAP) encapsulations.



**Caution** The POSIP is made up of two main parts: a dual-width port adapter and a motherboard. To prevent problems with the POSIP and with the system in which the POSIP is installed, do not attempt to separate the POSIP’s port adapter from its motherboard or to install other port adapters on the POSIP motherboard. The entire POSIP assembly is a field replaceable unit (FRU).

The POSIP comes configured with either 16 MB or 32 MB of dynamic random-access memory (DRAM) and 1 or 2 MB of static random-access memory (SRAM) as the factory default memory configurations. The DRAM and SRAM on the POSIP-OC3-20 models can be upgraded as your system configuration requires. (For DRAM and SRAM upgrade procedures, refer to the section “Upgrading POSIP DRAM and SRAM” on page 38.)

The network interfaces reside on the POSIP and provide a direct connection between the high-speed Cisco Extended Bus (CxBus or CyBus) and the external networks. The physical layer interface on the POSIP is OC-3. There are no restrictions on slot locations or sequence; you can install a POSIP in any available interface processor slot.



**Caution** Traffic from multiple POSIP network interfaces could theoretically exceed the bandwidth of the CxBus or CyBus. This would cause packets to be dropped; therefore, a practical limit for the CxBus in Cisco 7000 series chassis is two POSIPs, and for the CyBus in Cisco 7500 series chassis the practical limit is four POSIPs.

## POSIP Features

The POSIP supports the following features:

- Standards-compliant SONET/SDH interface; SONET/STS-3c and SDH/STM-1 framing and signaling overhead
- Full-duplex operation at 155 Mbps
- Intermediate reach optical interface with single-mode fiber
- Optical interface with multimode fiber
- Online insertion and removal (OIR), enabling you to remove, add, or replace POSIPs on line
- 16 to 32 MB of onboard packet and program DRAM to support transmit and receive buffering
- 1 to 2 MB of onboard SRAM
- Support for 16-bit and 32-bit cyclic redundancy checking (CRC-16 and CRC-32, respectively)

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**Note** Only CRC-16 can be used if the SONET payload scrambling feature is enabled. (For specific and important hardware and software requirements, refer to the section “POSIP Installation Prerequisites,” on page 11, and to use the SONET payload scrambling feature, refer to the section “Configuring SONET Payload Scrambling” on page 34.)

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## POSIP Memory Configurations

Following are the POSIP DRAM and SRAM configurations by product number, memory configuration, and optical-fiber connections:

- POSIP-OC3-20-SM=—16-MB DRAM, 1-MB SRAM; single-mode/multimode connections
- POSIP-OC3-20-MM=—16-MB DRAM, 1-MB SRAM; multimode connections

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**Note** The POSIP-OC3-20 models, while no longer available as new products, are still supported in the field and discussed in this publication.

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- POSIP-OC3-40-SM(=)—32-MB DRAM, 2-MB SRAM; single-mode/multimode connections
- POSIP-OC3-40-MM(=)—32-MB DRAM, 2-MB SRAM; multimode connections

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**Note** These POSIP products are represented by the POSIP illustration shown in Figure 1.

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## POSIP Upgrade Products

If you purchased a pre-POSIP product (Product Numbers Pre-POSIP-20-SM=, Pre-POSIP-20-MM=, Pre-POSIP-40-SM=, or Pre-POSIP-40-MM=), refer to Table 1, which lists the POSIP upgrade products that are available and the pre-POSIP products they replace.

**Table 1 POSIP Upgrade Products**

POSIP Upgrade Product <sup>1</sup>	Upgrades from...	To...
Pre-POS20sm-UPG	Pre-POSIP-20-SM=	POSIP-OC3-20-SM=
Pre-POS40sm-UPG	Pre-POSIP-40-SM=	POSIP-OC3-40-SM=
Pre-POS20mm-UPG	Pre-POSIP-20-MM=	POSIP-OC3-20-MM=
Pre-POS40mm-UPG	Pre-POSIP-40-MM=	POSIP-OC3-40-MM=

1. Shipped *only* to users who have the pre-POSIP products listed in the second column.

## POSIP Network Management Support

Following is the protocol and management information base (MIB) support for the POSIP:

- SNMP agent v1 (RFC 1155-1157)
- MIB II (RFC 1213); POSIP MIB support will not be available with the initial POSIP release.

## Encapsulation Method Supported for POSIP

The following encapsulation method is supported by the POSIP: RFC 1619 Point-to-Point Protocol over SONET/SDH.

## POSIP Specifications and Guidelines

The Packet OC-3 interface is full duplex. You must use the appropriate optical-fiber interface cable(s) to connect the POSIP with an external network. Refer to the section “POSIP Interface Cables” on page 12 for descriptions of connectors and optical-fiber cables. The POSIP, shown in Figure 1, provides an interface to switching fabrics for transmitting and receiving data at rates of up to 155.520 Mbps bidirectionally. The POSIP connects to the following physical layers:

- Multimode—155 Mbps, OC-3 optical fiber (SONET STS-3c or SDH STM-1)
- Single-mode—155 Mbps, OC-3 optical fiber (SONET STS-3c or SDH STM-1)

## POSIP Distance Limitations

The Packet-Over-SONET specification for optical-fiber transmission defines two types of fiber: single mode and multimode. Modes can be thought of as bundles of light rays entering the fiber at a particular angle. Single-mode fiber allows only one mode of light to propagate through the fiber, while multimode fiber allows multiple modes of light to propagate through the fiber. Because multiple modes of light propagating through the fiber travel different distances depending on the entry angles, causing them to arrive at the destination at different times (a phenomenon called modal dispersion), single-mode fiber is capable of higher bandwidth and greater cable run distances than multimode fiber. Table 2 lists typical maximum distances for single-mode and multimode transmission.

**Note** If the distance between two connected stations is greater than these maximum distances, significant signal loss can result, making transmission unreliable.

**Table 2 Maximum Optical-Fiber Power Budget and Transmission Distances**

Transceiver Type	Power Budget	Transmit Power	Receive Power	Maximum Distance between Stations <sup>1</sup>
Single mode <sup>2</sup>	16 dB	-15 to -8 dBm, at 1270–1380 nm <sup>3</sup>	-31 to -8 dBm	Up to 9 miles (15 kilometers)
Multimode <sup>2</sup>	11.5 dB	-18.5 to -14 dBm, at 1270–1380 nm	-30 to -14 dBm	Up to 1.5 miles (3 kilometers)

1. Table 2 gives typical results. You should use the power budget calculations to determine the actual distances.
2. Complies with Bellcore GR-253 Intermediate Reach Specification.
3. Where nm = nanometers.

## Power Budget

To design an efficient optical data link, evaluate the power budget. The power budget is the amount of light available to overcome attenuation in the optical link and to exceed the minimum power that the receiver requires to operate within its specifications. Proper operation of an optical data link depends on modulated light reaching the receiver with enough power to be correctly demodulated. Attenuation, caused by the passive media components (cables, cable splices, and connectors), is common to both multimode and single-mode transmission.

The following variables reduce the power of the signal (light) transmitted to the receiver in multimode transmission:

- Chromatic dispersion (spreading of the signal in time because of the different speeds of light wavelengths)
- Modal dispersion (spreading of the signal in time because of the different propagation modes in the fiber)

Attenuation is significantly lower for optical fiber than for other media. For multimode transmission, chromatic and modal dispersion reduce the available power of the system by the combined dispersion penalty (dB). The power lost over the data link is the sum of the component, dispersion, and modal losses.

Table 3 lists the factors of attenuation and dispersion limit for typical optical-fiber cable.

**Table 3 Typical Optical-Fiber Link Attenuation and Dispersion Limits**

Limits	Single Mode	Multimode
Attenuation	0.5 dB	1.0 dB/km
Dispersion	No limit	500 MHz(km) <sup>1</sup>

1. The product of bandwidth and distance must be less than 500 MHz (km).



### Approximating the Multimode Power Margin

The LED used for a multimode transmission light source creates multiple propagation paths of light, each with a different path length and time requirement to cross the optical fiber, causing signal dispersion (smear). Higher order mode loss (HOL) results from light from the LED entering the fiber and being radiated into the fiber cladding. A worst case estimate of power margin (PM) for multimode transmissions assumes minimum transmitter power (PT), maximum link loss (LL), and minimum receiver sensitivity (PR). The worst case analysis provides a margin of error, although not all of the parts of an actual system will operate at the worst case levels.

The power budget (PB) is the maximum possible amount of power transmitted. The following equation lists the calculation of the power budget for multimode, worst case:

$$PB = PT - PR$$

$$PB = -18.5 \text{ dBm} - (-30 \text{ dBm})$$

$$PB = 11.5 \text{ dB}$$

The power margin calculation is derived from the power budget and subtracts the link loss, as follows:

$$PM = PB - LL$$

If the power margin is positive, as a rule, the link will work.

Table 4 lists the factors that contribute to link loss and the estimate of the link loss value attributable to those factors.

**Table 4 Estimating Link Loss**

Link Loss Factor	Estimate of Link Loss Value
Higher order mode losses	0.5 dB
Clock recovery module	1 dB
Modal and chromatic dispersion	Dependent on fiber and wavelength used
Connector	0.5 dB
Splice	0.5 dB
Fiber attenuation	1 dB/km

After calculating the power budget minus the data link loss, the result should be greater than zero. Results less than zero may have insufficient power to operate the receiver. The signal must meet the worst case power parameters listed in Table 5.

**Table 5 POSIP Signal Requirements**

Power Parameters	Single Mode	Multimode
PT	-15 dBm	-18.5 dBm
PR	-31 dBm	-30 dBm
PM	16 dB	11.5 dB

### Multimode Power Budget Example with Sufficient Power for Transmission

The following is an example multimode power budget calculated based on the following variables:

Length of multimode link = 3 kilometers (km)

4 connectors

3 splices

Higher order loss (HOL)

Clock recovery module (CRM)

Estimate the power budget as follows:

$$PM = 11.5 \text{ dB} - 3 \text{ km} (1.0 \text{ dB/km}) - 4 (0.5 \text{ dB}) - 3 (0.5 \text{ dB}) - 0.5 \text{ dB (HOL)} - 1 \text{ dB (CRM)}$$

$$PM = 11.5 \text{ dB} - 3 \text{ dB} - 2 \text{ dB} - 1.5 \text{ dB} - 0.5 \text{ dB} - 1 \text{ dB}$$

$$PM = 3.5 \text{ dB}$$

The positive value PM indicates that this link would have sufficient power for transmission.

### Single-Mode and Multimode Transmit and Receive Power Specifications

The single-mode signal source is an injection laser diode. The multimode signal source is a light-emitting diode (LED). Single-mode transmission is useful for longer distances because there is a single transmission path within the fiber and dispersion does not occur. In addition, chromatic dispersion is also reduced because laser light is essentially monochromatic.

Power specifications for single-mode transmission follow:

- Transmit (TX) power: -15 to -8 dBm @ wavelength 1260–1360 nanometers (nm)
- Receive (RX) power: -31 to -8 dBm

Power specifications for multimode transmission follow:

- TX power: -18.5 to -14 dBm @ wavelength 1270–1380 nm
- RX power: -30 to -14 dBm

### Single-Mode Power Budget Example

The following example of a single-mode power budget is of a two buildings, 11 kilometers apart, connected through a patch panel in an intervening building with a total of 12 connectors.

Length of single-mode link = 11 km

12 connectors

Estimate the power budget as follows:

$$PM = 16 \text{ dB} - 11 \text{ km} (0.5 \text{ dB/km}) - 12 (0.5 \text{ dB})$$

$$PM = 16 \text{ dB} - 5.5 \text{ dB} - 6 \text{ dB}$$

$$PM = 5.5 \text{ dB}$$

The value of PM indicates that this link would have sufficient power for transmission and is not in excess of the maximum receiver input power.

### Using Statistics to Estimate the Power Budget

Statistical models more accurately determine the power budget than the worst case method. Determining the link loss with statistical methods requires accurate knowledge of variations in the data link components. Statistical power budget analysis is beyond the scope of this document. For further information, refer to ITU-T standards and your equipment specifications.

### Power Budget and Attenuation References

The following publications contain information on determining attenuation and power budget:

- T1E1.2/92-020R2 ANSI, the Draft American National Standard for Telecommunications entitled “Broadband ISDN Customer Installation Interfaces: Physical Layer Specification.”
- *Power Margin Analysis, AT&T Technical Note, TN89-004LWP, May 1989*

## POSIP Installation Prerequisites

Before you begin this installation, review the safety and ESD-prevention guidelines in this section to avoid injuring yourself or damaging the equipment. This section also provides a list of parts and tools you will need to perform the installation.

## POSIP Hardware Requirements

The POSIP will operate in the Cisco 7000 series routers providing these routers have the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI) installed. The POSIP will operate in all of the Cisco 7500 series routers, which use the Route Switch Processor (RSP1, RSP2, or RSP4).

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**Note** The POSIP has firmware that allows it to do SONET payload scrambling; however, this functionality might disallow support for 32-bit cyclic redundancy check (CRC-32) depending on the hardware version of the dual-width POS port adapter you have installed.

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Use the Table 6 to determine CRC and SONET payload scrambling compatibility for the dual-width POS port adapter currently installed in your system. While the POSIP supports CRC-32 and CRC-16, you can only use CRC-16 if you have a dual-width POS port adapter that is Hardware Version 1.5, 1.30, or 1.31.

**Table 6 Dual-Width POS Port Adapter Hardware Version Compatibility Matrix**

CRC-16	CRC-32	SONET Payload Scrambling	Hardware Version Required
Yes	Yes	No	Version 1.4, Version 1.14 (decimal) Version 1.4, Version 1.E (hexadecimal)
Yes	No	Yes	Version 1.5, Version 1.30, Version 1.31 (decimal) Version 1.5, Version 1.1E, Version 1.1F (hexadecimal)
–	–	–	Version 1.0 to Version 1.3 (beta hardware)

## POSIP Software Requirements

The POSIP is compatible with any Cisco 7500 series router or any Cisco 7000 series router running Cisco IOS Release 11.1(8) or later, or Cisco IOS Release 11.2(1) or later; however, the SONET payload scrambling feature is *not* supported by these Cisco IOS software releases.

The POSIP is compatible with any Cisco 7500 series router or any Cisco 7000 series router running Cisco IOS Release 11.1(15)CA or later, or one of the following planned Cisco IOS software releases: Cisco IOS Release 11.2(10)P or later, and future releases of Cisco IOS Release 11.2GS and Cisco IOS Release 11.3. The SONET payload scrambling feature is supported by these Cisco IOS software releases.

The **show diagbus** command displays the hardware version of the dual-width POS port adapter on your POSIP.

The **show version** command displays the current hardware configuration of the router, including the system software version that is currently loaded and running, and the type of system processor board installed: RSP, RSP7000, and so forth.

The **show controller cbus** command lists all CxBus (Cisco 7000 series) and CyBus (Cisco 7500 series) interfaces and includes the currently loaded and running microcode version for each. You can check the version of the default ROM image by either removing the board and checking the ROM labels, or by configuring the interface or system software to boot from ROM, restarting the system, and using these same commands to check the running version.

Use the **show version** command to display the current system software version, and use the **show controller cbus** command to display the microcode version of the system processor and each interface processor.

If the running system software is an earlier version than what you require for your configuration and requirements, check Flash memory to determine if the required images are available on your system. The **show flash** command displays a list of all files stored in Flash memory.

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**Note** Specific POSIP microcode images can be loaded automatically from the system bundle, or specifically from Flash memory. There are two types of Flash memory: PCMCIA-based Flash memory cards, referred to as either slot0: or slot1:, and bootflash, which is imbedded Flash memory on the POSIP.

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## POSIP Interface Cables

The POSIP single-mode or multimode, optical-fiber interface cable is used to connect your router to a network or to connect two POSIP-equipped routers back-to-back.

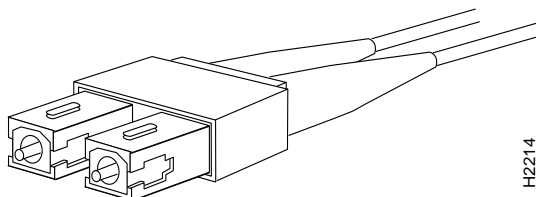
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**Note** Single-mode and multimode optical-fiber cables for the POSIP are not available from Cisco Systems, but are available from commercial cable vendors.

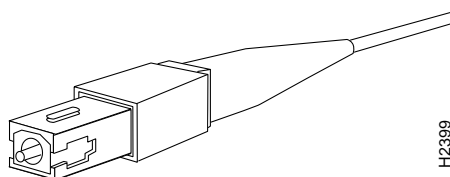
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For SONET/SDH single-mode and multimode optical-fiber connections, use one duplex SC-type cable (see Figure 3) or two simplex SC-type cables (see Figure 4).

**Figure 3 Duplex SC Cable Connector**



**Figure 4 Simplex SC Cable Connector**



## Guidelines for Installing and Removing Processor Modules

The processor modules for the Cisco 7000 series and Cisco 7500 series slide into slots in the rear of the chassis and connect directly to the backplane. The backplane slots are keyed so that the processor modules can be installed only in the slots designated for them. Figure 5 shows the ejector levers and captive installation screws on a typical interface processor. To remove an interface processor, loosen the captive screws and pull the ejector levers to the sides; then pull the module out using the handle.

To insert an interface processor, reverse the process, making sure to firmly seat the interface processor in its connectors on the backplane. For detailed directions, refer to the procedures in “Removing the POSIP,” on page 25, and “Installing a New or Replacement POSIP and Connecting Interface Cables” on page 26.



**Caution** Always use the ejector levers to remove or install the POSIP. The ejectors help ensure that backplane connectors on the card are fully seated in, or fully ejected from, the backplane. Failure to use the ejector levers could result in a partial backplane connection, which can hang the system or could damage the backplane.

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**Note** The POSIP is oriented horizontally in the Cisco 7010 and Cisco 7505 and vertically in the Cisco 7000, Cisco 7507, and Cisco 7513.

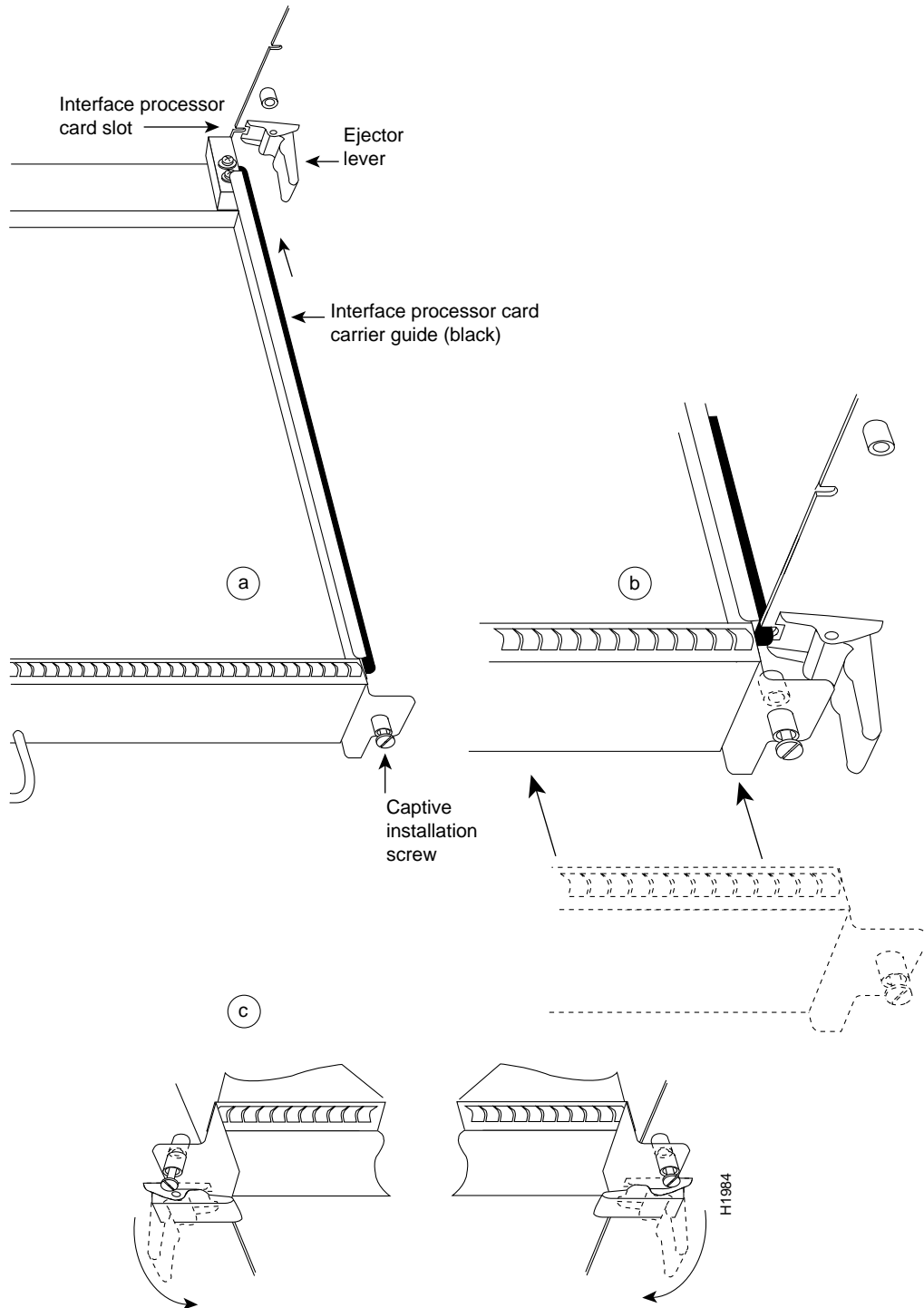
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**Caution** The POSIP is made up of two parts: a dual-width port adapter and a motherboard. To prevent problems with the POSIP and with the system in which the POSIP is installed, do not attempt to separate the POSIP’s port adapter from its motherboard. The entire POSIP assembly is a field replaceable unit (FRU).

The captive installation screws on the ends (see Figure 5) of each faceplate, when tightened, provide EMI shielding and also help ensure proper seating in the backplane. After using the ejector levers to install a POSIP, immediately tighten the captive installation screws. These screws *must* be tightened to meet EMI specifications and to prevent accidentally dislodging the POSIP from the backplane.

**Figure 5 Ejector Levers and Captive Installation Screws (Horizontal Orientation Shown)**



## List of Parts and Tools

You need the following tools and parts to install or upgrade a POSIP. If you need additional equipment, contact your service representative for ordering information.

- One of the following POSIP models:
  - POSIP-OC3-20-SM=
  - POSIP-OC3-20-MM=
  - POSIP-OC3-40-SM(=)
  - POSIP-OC3-40-MM(=)
 (Refer also to the section “POSIP Upgrade Products” on page 7.)
- One SC-type duplex or two SC-type simplex, multimode or single-mode, optical-fiber interface cable to connect the POSIP’s interface with the network.

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**Note** Single-mode and multimode optical-fiber cables for the POSIP are not available from Cisco Systems, but are available from commercial cable vendors.

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- Number 2 Phillips screwdriver and 3/16-inch flat-blade screwdriver
- ESD-preventive wrist strap

## Safety Guidelines

This section lists safety guidelines to follow when working with any equipment that connects to electrical power or telephone wiring.

### Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement.



**Warning** This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Waarschuwing** Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

**Varoitus** Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasta (määräysten noudattaminen ja tietoa turvallisuudesta).

**Attention** Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

**Warnung** Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewusst. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

**Avvertenza** Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

**Advarsel** Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

**Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.

**¡Advertencia!** Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.

**Varning!** Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förekommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.



## Laser Safety

The single-mode aperture port contains an laser warning label, as shown in Figure 6.

**Figure 6 Laser Warning Labels on POSIP for Single Mode**



**Warning** Invisible laser radiation may be emitted from the aperture ports of the single-mode products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures.*



**Warning** Class 1 laser product.

## Electrical Equipment Safety

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 moving a chassis.
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

## Telephone Wiring Safety

Use the following guidelines when working with any equipment that is connected to telephone wiring or to 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 can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. The POSIP comprises 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 metal carrier helps to protect the board from ESD, always use a preventive antistatic strap when handling the POSIP. 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 POSIP. (See Figure 5.) These screws prevent accidental removal, provide proper grounding for the system, and help ensure that the bus connectors are properly seated in the backplane.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that the strap makes good skin contact.
- Connect the equipment end of the strap to a captive installation screw on an installed power supply.
- When installing a POSIP, use the ejector levers to properly seat the bus connectors in the backplane, then tighten both (top and bottom) captive installation screws. (See Figure 5.) These screws prevent accidental removal, provide proper grounding for the system, and help to ensure that the bus connectors are seated in the backplane.
- When removing a POSIP, use the ejectors to release the bus connectors from the backplane. Hold the handle on the front of the POSIP with one hand and support the bottom edge of the metal carrier with the other hand. Pull the carrier out slowly, using your hand along the bottom of the carrier to guide the POSIP straight out of the slot.
- Handle carriers by the handles and carrier edges only; avoid touching the board or any connector pins.
- Place a removed POSIP board-side-up on an antistatic surface or in a static shielding bag. If the component will be returned to the factory, immediately place the POSIP in a static shielding bag.
- Avoid contact between the POSIP and clothing. The wrist strap only protects the board from ESD voltages on the body; ESD voltages on clothing can still cause damage.



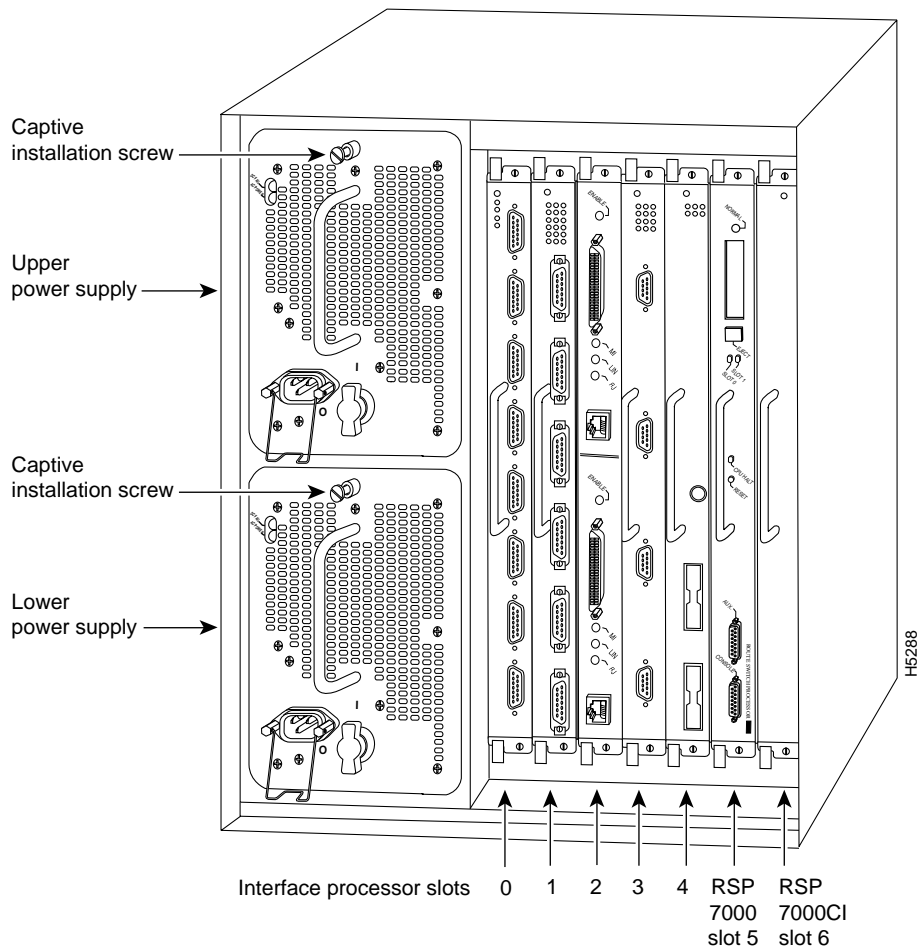
**Caution** For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megaohms.

## What Is the Cisco 7000 Series?

The Cisco 7000 series consists of the Cisco 7000 and Cisco 7010 routers. The POSIP will operate in the Cisco 7000 series routers providing these routers have the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI) installed. For Cisco IOS software requirements, refer to the section “POSIP Software Requirements” on page 12. Network interfaces reside on modular interface processors, including the POSIP, which provide a direct connection between external networks and the high-speed CxBus in the Cisco 7000 series.

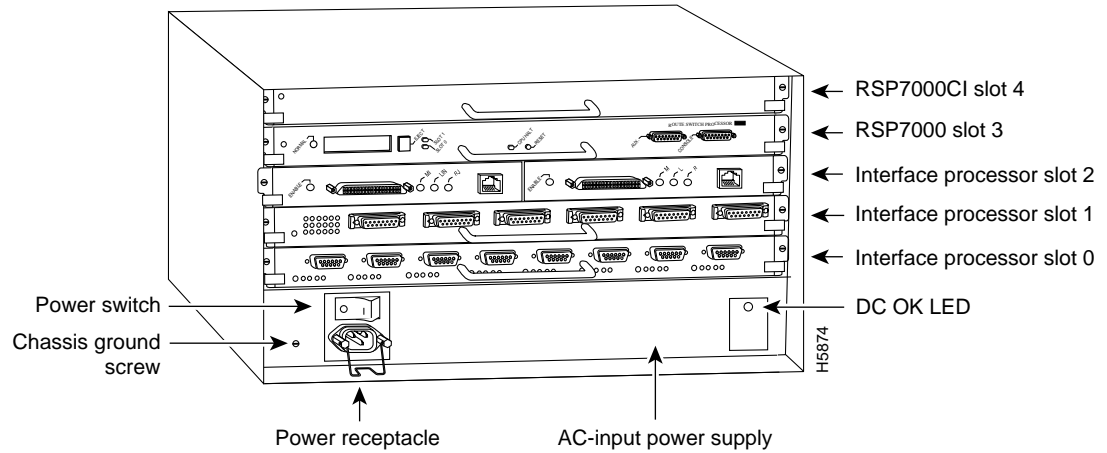
In the Cisco 7000, slot 5 is reserved for the RSP7000 (7000 RSP slot shown in Figure 7), which contains the system processor and performs packet switching functions, and slot 6 is reserved for the RSP7000CI (7000 CI slot shown in Figure 7), which contains all of the environmental monitoring functions for the Cisco 7000. The remaining five slots (slots 0 through 4) are for interface processors.

**Figure 7 Cisco 7000 with RSP7000 and RSP7000CI Installed (Interface Processor End)**



In the Cisco 7010, slot 3 is reserved for the RSP7000 (7000 RSP slot shown in Figure 8), which contains the system processor and performs packet switching functions, and slot 4 is reserved for the RSP7000CI (7000 CI slot shown in Figure 8), which contains all of the environmental monitoring functions for the Cisco 7010. The remaining three slots (slots 0 through 2) are for interface processors.

**Figure 8 Cisco 7010 with RSP7000 and RSP7000CI Installed (Interface Processor End)**



## What Is the Cisco 7500 Series?

The Cisco 7500 series consists of the Cisco 7505, Cisco 7507, and Cisco 7513 routers. The POSIP will operate in all the Cisco 7500 series routers. For Cisco IOS software requirements, refer to the section “POSIP Software Requirements” on page 12. Network interfaces reside on modular interface processors, including the POSIP, which provide a direct connection between external networks and the high-speed CyBus in the Cisco 7500 series.

Figure 9, Figure 10, and Figure 11 show the rear of the Cisco 7500 series routers: the five-slot Cisco 7505, the seven-slot Cisco 7507, and the thirteen-slot Cisco 7513, respectively.

In the Cisco 7505 (see Figure 9), one slot (4) is reserved for the Route Switch Processor (RSP1), which contains the system processor and performs packet switching functions. Slots 0 through 3 are for interface processors.

**Figure 9 Cisco 7505 (Interface Processor End)**

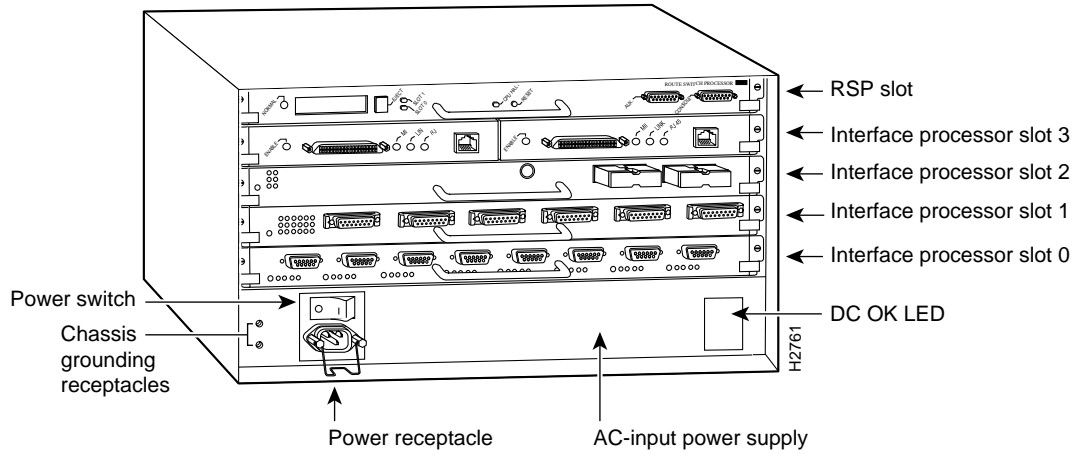


Figure 10 shows the rear of the seven-slot Cisco 7507 router. In the Cisco 7507, up to two slots (2 and 3) are reserved for the Route Switch Processor (RSP2), which contains the system processor and performs packet switching functions. Slots 0 and 1 and 4 through 6 are for interface processors.

**Figure 10 Cisco 7507 (Interface Processor End)**

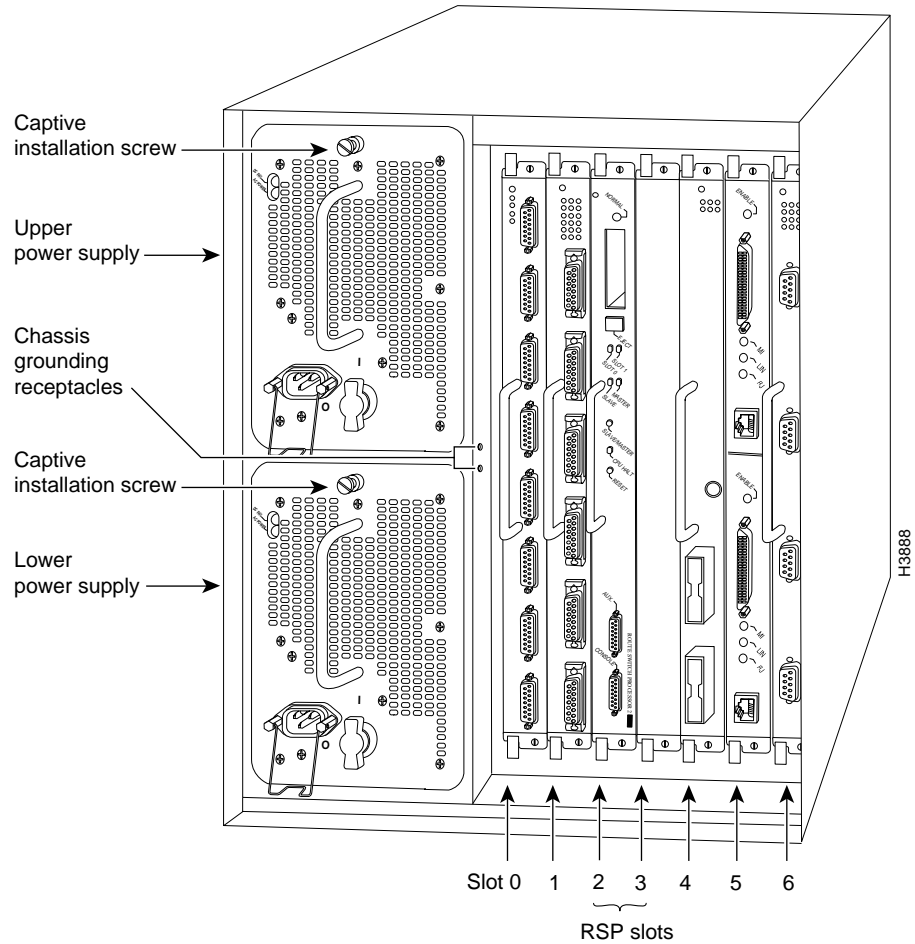
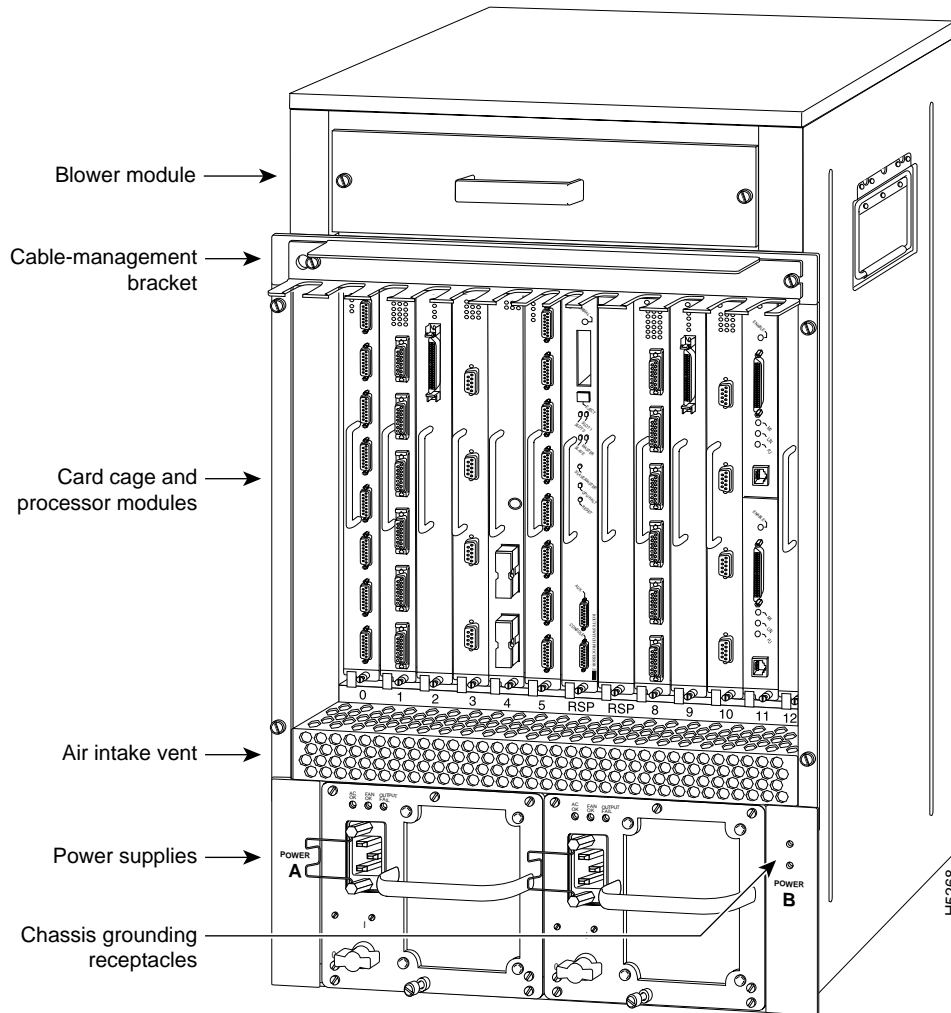


Figure 11 shows the rear of the Cisco 7513 with two AC-input power supplies installed. Two slots (6 and 7) are reserved for the Route Switch Processor (RSP), which contains the system processor and performs packet switching functions. Slots 0 through 5 and 8 through 12 are for interface processors.

**Figure 11 Cisco 7513 (Interface Processor End)**



## POSIP Installation Guidelines and Procedures

The following sections describe the procedures for removing or installing a POSIP in a Cisco 7000 series or 7500 series router. The online insertion and removal (OIR) feature allows you to install and remove a POSIP without turning off system power; however, you must follow the insertion instructions carefully. For example, failure to use the ejector levers or insert the POSIP properly can cause system error messages indicating a board failure.

The function of the ejector levers on the POSIP is to align and seat the card connectors in the backplane. Failure to use the ejectors and insert the interface processor properly can disrupt the order in which the pins make contact with the backplane. Follow the POSIP installation and removal instructions carefully, and review the following examples of *incorrect* insertion practices and results:

- Using the handle to force the interface processor all the way into the slot can pop the ejectors out of their springs. If you then try to use the ejectors to seat the interface processor, the first layer of pins (which are already mated to the backplane) can disconnect and then remate with the backplane, which the system interprets as a board failure.
- Using the handle to force or slam the interface processor all the way into the slot can also damage the pins on the board connectors if they are not aligned properly with the backplane.
- When using the handle (rather than the ejectors) to seat the POSIP in the backplane, you might need to pull the POSIP back out and push the POSIP in again to align the pins properly. Even if the connector pins are not damaged, the pins mating with and disconnecting from the backplane will cause the system to interpret a board failure. Using the ejectors ensures that the board connector mates with the backplane in one continuous movement.
- Using the handle to insert or remove a POSIP, or failing to push the ejectors to the full 90-degree position, can leave some (not all) of the connector pins mated to the backplane, a state which will hang the system. Using the ejectors and making sure that they are pushed fully into position ensures that all three layers of pins are mated with (or free from) the backplane.

Use the ejector levers when removing a POSIP to ensure that the board connector pins disconnect from the backplane in the logical sequence expected by the system. Any RP, SP, or interface processor that is only partially connected to the backplane can hang the bus. Detailed steps for correctly performing OIR are included with the following procedures for installing and removing a POSIP.



**Caution** To avoid erroneous failure messages, remove or insert only one interface processor at a time. Also, after inserting or removing an interface processor, allow at least 15 seconds before removing or inserting another interface processor so that the system can reinitialize and note the current configuration of all interfaces.



## Removing the POSIP

If you are replacing a failed interface processor, remove the existing board first, then install the new interface processor in the same slot.

---

**Note** In Cisco 7507 or Cisco 7513 systems, on-line insertion and removal of any interface processor in either CyBus might cause the slave RSP2 to reboot with a bus error or a processor memory parity error. The master RSP will recover from this event and issue a “cBus Complex Restart” message. Cisco 7507 and Cisco 7513 systems that are configured with an RSP4 as the system slave are not affected and will not experience this problem.

---

If you have a Cisco 7507 or a Cisco 7513 with an RSP2 configured as the system slave, we strongly recommend that you use the following procedure to remove and replace an interface processor:

- Step 1** Remove the slave RSP2.
- Step 2** Wait 15 seconds.
- Step 3** Remove and replace the interface processor using the procedures in this publication.
- Step 4** Wait 15 seconds.
- Step 5** Reinsert the slave RSP2.

Before you remove an interface processor that you will not replace, or replace an interface processor component, we recommend you shut down (disable) the interfaces to prevent anomalies when you reinstall the new or reconfigured interface processor. When you shut down an interface, it is designated *administratively down* in the **show** command displays. Figure 12 shows proper handling of a POSIP during installation.

To remove a POSIP, follow these steps:

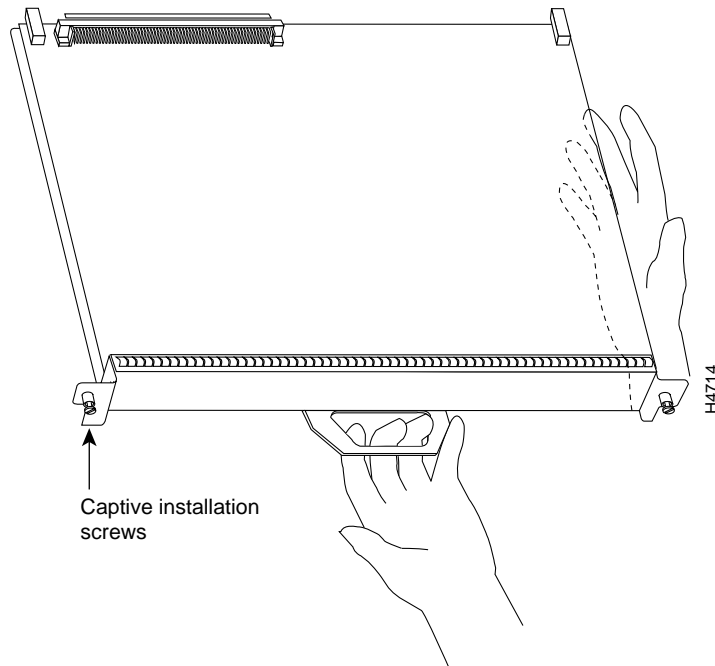
- Step 1** Disconnect any interface cables from the ports on the front of the port adapter, although, this is not required. You can remove processor modules with cables attached; however, we do not recommend it.
- Step 2** Slip on an ESD-preventive wrist strap and attach the strap to any unfinished surface on the chassis.
- Step 3** Use a screwdriver to loosen the captive installation screws on the ends of the POSIP. (See Figure 12.)



**Caution** Always use the ejector levers to remove or install the POSIP. Failure to do so can cause erroneous system error messages indicating a board failure.

- Step 4** Place your thumbs on the upper and lower ejectors and simultaneously push the top ejector up and the bottom ejector down (in the opposite direction from that shown in Figure 5c) to release the POSIP from the backplane connector.
- Step 5** Grasp the POSIP handle with one hand and place your other hand under the carrier to guide the POSIP out of the slot. (See Figure 12.) Avoid touching the board or any connector pins.

**Figure 12 Handling a POSIP During Installation (Horizontal Orientation Shown)**



- Step 6** Carefully pull the POSIP straight out of the slot, keeping your other hand under the carrier to guide the POSIP. (See Figure 12.) Keep the POSIP at a 90-degree orientation to the backplane.
- Step 7** Place the removed POSIP on an antistatic mat or foam pad, or place the POSIP in an antistatic bag if returning the POSIP to the factory.
- Step 8** If the interface processor slot is to remain empty, install an interface processor filler (MAS7K-BLANK) to keep dust out of the chassis and to maintain proper airflow through the interface processor compartment.

## Installing a New or Replacement POSIP and Connecting Interface Cables

The POSIP slides into any available interface processor slot and connects directly to the backplane. The backplane slots are keyed so that the POSIP can be installed only in an interface processor slot. Interface processor fillers, which are blank interface processor carriers, occupy empty slots to maintain consistent airflow through the interface processor compartment.

If you are installing a new POSIP, you will have to first remove the interface processor filler from the available interface processor slot. Figure 5 shows the functional details of inserting an interface processor and using the ejectors. Figure 12 shows proper handling of an interface processor during installation.



**Caution** To avoid erroneous failure messages, remove or insert only one interface processor at a time. Also, after inserting or removing an interface processor, allow at least 15 seconds before removing or inserting another interface processor so that the system can reinitialize and note the current configuration of all interfaces.

Follow these steps to install a new or replacement POSIP:

- Step 1** Ensure that a console terminal is connected to the *Console* port on the RSP, and that the console terminal is turned on. (This step is optional.)
- Step 2** Choose an available interface processor slot for the POSIP, and ensure that the interface cable is of a sufficient length to connect the POSIP with the network.
- Step 3** Interface processors and interface processor fillers are secured with two captive installation screws. (See Figure 5.) Use a screwdriver to loosen the captive installation screws and remove the interface processor filler (or the existing POSIP) from the slot. If you remove a POSIP, immediately place it into an antistatic bag to prevent damage from electrostatic discharge.
- Step 4** Hold the POSIP handle with one hand, and place your other hand under the carrier to support the POSIP and guide the carrier into the slot. (See Figure 12.) Avoid touching the card or any connector pins.



**Caution** To prevent ESD damage, handle interface processors by the handles and carrier edges only.

- Step 5** Place the back of the POSIP in the chassis slot and align the notch on the carrier with the groove in the slot. (See Figure 5a.)
- Step 6** While keeping the POSIP at a 90-degree orientation to the backplane, carefully slide the POSIP into the slot until the back of the faceplate makes contact with the ejector levers, then *stop*. (See Figure 5b.)
- Step 7** Using the thumb and forefinger of each hand to pinch each ejector, simultaneously push the levers inward (toward the handle) until they are at a full 90-degree orientation to the faceplate. (See Figure 5c.)



**Caution** To prevent system problems, always use the ejector levers when installing or removing processor modules. A module that is partially seated in the backplane will cause the system to hang and subsequently crash.

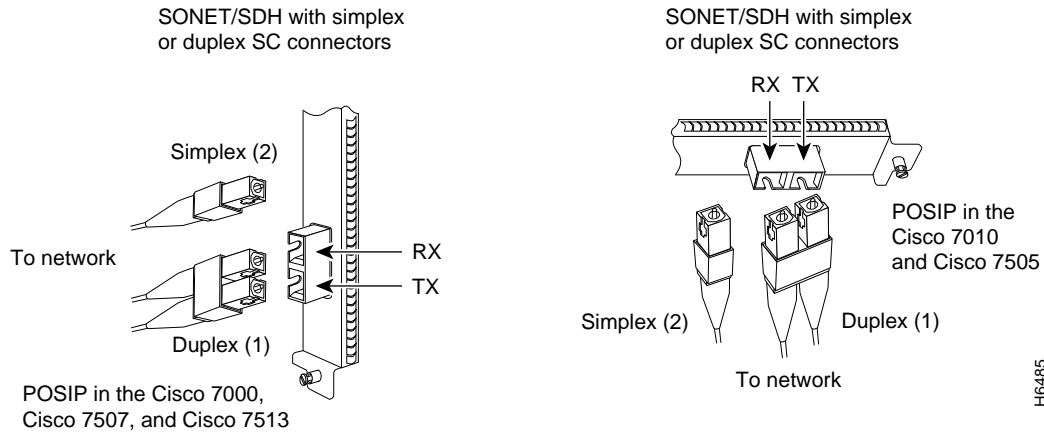
- Step 8** Use a 3/8-inch flat-blade screwdriver to tighten the captive installation screws on the ends of the POSIP. (See Figure 5.) (These screws must be tightened for maximum EMI protection.)



**Caution** To ensure that compliance with EMI standards is maintained, always tighten the captive installation screws on interface processors immediately after installation. Also, these screws prevent accidental removal and provide proper grounding for the system.

- Step 9** Attach either two simplex fiber cables or one duplex fiber cable between the Packet OC-3 interface port and your network. (See Figure 13 for the POSIP orientation applicable to your chassis type.) Ensure that you observe the receive (RX) and transmit (TX) cable relationship shown in Figure 13.

**Figure 13 Attaching Simplex or Duplex Fiber Cables to the POSIP**



**Warning** Invisible laser radiation may be emitted from the aperture ports of the single-mode products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures.*



**Warning** Class 1 laser product.

## Checking the Installation

After you install the POSIP and connect optical-fiber cables, verify the installation by observing the LED states and the console display. When the system has reinitialized all interfaces, the enabled LED on the POSIP and on all interface processors should go on. The console screen will also display a message as the system discovers each interface during its reinitialization. After system initialization, the enabled LED, which is present on all interface processors, goes on to indicate that the POSIP is enabled for operation.

The following conditions must all be met before the POSIP is enabled; if any one of these conditions is not met, the enabled LED does not go on:

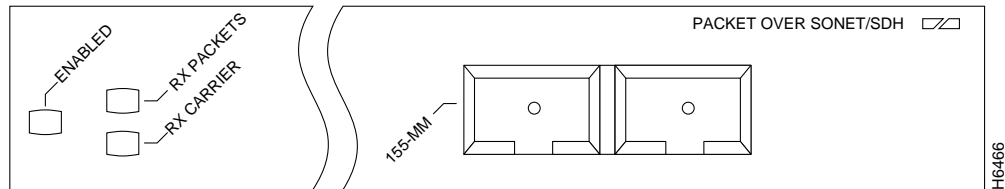
- The POSIP is correctly connected to the backplane and receiving power from the backplane.
- The system bus recognizes the POSIP.
- A valid version of POSIP microcode is loaded and running.

### POSIP LEDs

The three LEDs on POSIP’s faceplate (see Figure 14) indicate the following:

- **ENABLED**—When on, indicates that the POSIP is enabled for operation; however, the interface port might be in the shutdown state.
- **RX PACKETS**—When on, indicates that the POSIP has received a packet. This LED will flicker in normal operation, indicating traffic.
- **RX CARRIER**—When on, indicates that the POSIP has detected valid SONET/SDH framing on the received carrier.

**Figure 14 POSIP LEDs (Partial Faceplate View)**



## System Status Messages

When you remove and replace CxBus or CyBus interface processors, the system provides status messages on the console screen. The messages are for information only. The following sample display shows the events logged by the system as a POSIP was removed from slot 0; the system then reinitialized the remaining interface processors and marked as *down* the POSIP that was removed from slot 0. When the POSIP was reinserted, the system marked the interface as *up* again because the interface was not shut down before the POSIP was removed.

```
Router#
%OIR-6-REMCARD: Card removed from slot 0, interfaces disabled
%LINK-5-CHANGED: Interface POSIP0/0, changed state to administratively down

Router#
%OIR-6-INSCARD: Card inserted in slot 0, interfaces administratively shut down
%LINK-5-CHANGED: Interface POSIP0/0, changed state to up
```

When a new POSIP is inserted or when a POSIP is moved to a new slot, the system recognizes the new interface, but leaves the interface in a *down* state until you configure the interface. Change the state to *up* with the **configure** command. The following example display shows the events logged by the system as a new POSIP is inserted in slot 3:

```
Router#
%OIR-6-INSCARD: Card inserted in slot 3, interfaces administratively shut down
```

Verify that the POSIP is installed correctly as follows:

- Step 1** While the system reinitializes each interface, observe the console display messages and verify that the system discovers the POSIP as follows:
- If you installed a new POSIP, the system should recognize the new interface but leave the interface configured as *down*.
  - If you replaced a POSIP, the system should recognize the interface and put the interface into the same state (*up* or *down*) the interface had when removed.
- Step 2** When the reinitialization is complete, verify that the enabled LED on the POSIP is on and remains on. If the LED does stay on, proceed to Step 5. If the enabled LED does not stay on, proceed to the next step.
- Step 3** If the enabled LED on the POSIP fails to go on, suspect that the POSIP board connector is not fully seated in the backplane. Loosen the captive installation screws, then firmly push the top ejector down while pushing the bottom ejector up until both are at a 90-degree orientation to the POSIP faceplate. Tighten the captive installation screws. After the system reinitializes the interfaces, the enabled LED on the POSIP should go on. If the enabled LED goes on, proceed to Step 5. If the enabled LED does not go on, proceed to the next step.

- Step 4** If the enabled LED still fails to go on, remove the POSIP and try installing it in another available interface processor slot.
- If the enabled LED goes on when the POSIP is installed in the new slot, suspect a failed backplane port in the original interface processor slot.
  - If the enabled LED still does not go on, do not proceed with the installation. Contact a service representative to report the faulty equipment and obtain further instructions.
- Step 5** If the interface is new, proceed to “Configuring the POSIP” to configure the new interface. (The interface is not available until you configure it.)
- Step 6** If this installation was a replacement POSIP, use the **show interfaces** or **show controllers cbus** command to verify the status of the interface. (Refer to the section “Checking the Installation” for command descriptions and examples.)

---

**Note** POSIP interfaces are displayed and selected using the format slot/port-adapter/interface (x/y/z); where *x* is the chassis slot, *y* is always 0, and *z* is always 0.

---

- Step 7** When the interface is up, check the activity of the interface with the POSIP LEDs. (See Figure 1.) The LED states are described in the section “POSIP LEDs” on page 28.

If an error message displays on the console terminal, refer to the appropriate software publication for error message definitions. If you experience other problems that you are unable to solve, contact a service representative for assistance. This completes the POSIP installation. If you installed a new POSIP, you must now configure the new interface, as described in the following section.

## Configuring the POSIP

To configure the POSIP, complete the following tasks.

### Initial POSIP Configuration

On power up, a new POSIP is shut down. To enable the POSIP, you must enter the **no shutdown** command in the Configuration mode. (See the section “Using the configure Command,” which follows.)

If you installed a new POSIP or want to change the configuration of an existing interface, you must enter Configuration mode. When the POSIP is enabled (taken out of shutdown) with no additional arguments, the default interface configuration file parameters are as listed in Table 7.

**Table 7** POSIP Configuration Default Values

Parameter	Configuration Commands	Default Value
MTU	<b>mtu bytes (no mtu bytes)</b>	4470 bytes
Framing	<b>posip framing-sdh (no posip framing-sdh)</b>	SONET framing
Loopback internal	<b>loop internal (no loop internal)</b>	No internal loopback
Loopback line	<b>loop line (no loop line)</b>	No line loopback
Transmit clocking	posip internal-clock	Loop timing
SONET payload scrambling	pos scramble-atm	No scrambling

With the **loopback internal** command, packets from the router are looped back in the framer. Outgoing data gets looped back to the receiver without actually being transmitted. With the **loopback line** command, the receive (RX) fiber is logically connected to the transmit fiber (TX) so that packets from the remote router are looped back to it. Incoming data is received by the receiver, gets looped around, and is retransmitted. For back-to-back operation, at least one of the POSIPs must be configured to supply its internal clock to the line.

## Using the configure Command

After you verify that the new POSIP is installed correctly (the enabled LED goes on), you can use the **configure** command to configure the new interface. Be prepared with the information you will need, such as the interface IP address and MTU size.

Following are instructions for a basic configuration: enabling an interface and specifying IP routing. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available, refer to the appropriate software publications listed in the section “If You Need More Information” on page 2.

The Cisco 7000 series and 7500 series routers identify an interface address by its interface processor slot number and port number, in the format *slot/port*. Because each POSIP contains a single interface, the port number is always 0. For example, the slot/port address of an interface on a POSIP installed in interface processor slot 1 would be *1/0*.

Before using the **configure** command, you must enter the privileged level of the EXEC command interpreter with the **enable** command. The system will prompt you for a password if one is set. Press the Return key after each configuration step unless otherwise noted.

The following steps describe a basic configuration.

- Step 1** At the privileged-mode prompt, enter the Configuration mode and specify that the console terminal will be the source of the configuration subcommands as follows:

```
Router# configure terminal <CR>
```

- Step 2** At the prompt, specify the new interface to configure by entering the **interface** command, followed by the *type* (**posi**) and slot/port (interface processor slot number/port number). The example that follows is for a POSIP in interface processor slot 1:

```
Router(config)# interface posi 1/0/0
```

---

**Note** POSIP interfaces are displayed and selected using the format slot/port-adapter/interface (*x/y/z*); where *x* is the chassis slot, *y* is the port adapter slot (always 0), and *z* is the interface (always 0).

---

- Step 3** Determine the configure commands available for the POSIP's interface by entering **posi ?** at the Interface mode prompt, as follows:

```
Router(config-if)# posi ?
  posip framing-sdh          select sdh framing
  internal-clock            Use internal clock for transmit clock source
  transmitter-delay        Set flag bytes to insert after transmitting a datagram
```

Use the preceding configuration commands according to your specific requirements and based on their functions as indicated and described in the section “POSIP Configuration Parameters,” page 32, and in the appropriate software configuration publications.

- Step 4** Determine the **loopback** commands available by entering **loop ?** at the Interface mode prompt, as follows:

```
Router(config-if)# loop ?
    internal  internal
    line      line
```

Use the preceding configuration commands according to your specific requirements and based on their functions as indicated and described in the section “POSIP Configuration Parameters,” page 32, and in the appropriate software configuration publications.

- Step 5** If IP routing is enabled on the system, you can assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand, as in the following example:

```
Router(config-if)# ip address 10.1.2.3 255.255.255.0
```

- Step 6** Change the shutdown state to up and enable the interface as follows:

```
Router(config-if)# no shutdown
```

The **no shutdown** command passes an **enable** command to the POSIP. It also causes the POSIP to configure itself based on the previous configuration commands sent.

- Step 7** Add any additional configuration subcommands required to enable routing protocols and adjust the interface characteristics.

- Step 8** When you have included all of the configuration subcommands to complete the configuration, enter **^Z** (hold down the Control key while you press Z) to exit Configuration mode.

- Step 9** Write the new configuration to memory as follows:

```
Router# copy running-config startup-config
```

The system will display an OK message when the configuration has been stored. For an explanation of **show** commands that allow you to check the interface configuration, see “Checking the Configuration.”

## POSIP Configuration Parameters

The default values of all POSIP configuration parameters can be changed to match your network environment. Perform the tasks in the following sections if you need to customize the POSIP configuration:

- Selecting a Packet OC-3 Interface
- Setting the MTU Size
- Configuring Framing, page 33
- Configuring an Interface for Internal Loopback
- Configuring an Interface for Line Loopback on page 33
- Setting the Source of the Transmit Clock on page 33
- Configuring SONET Payload Scrambling, page 34



### Selecting a Packet OC-3 Interface

The Packet OC-3 interface is referred to as **posi** in the configuration commands. An interface is created for each POSIP found in the system at reset time. To select a specific Packet OC-3 interface, use the **interface posi slot/port adapter/interface** command, as follows:

```
Router(config)# interface posi x/y/z
```

where **x** is the interface processor slot number and differs by the Cisco router in which the POSIP is installed, **y** is the port adapter slot (always 0), and **z** is the interface (always 0).

### Setting the MTU Size

To set the transmission unit (MTU) size, use the following command:

```
Router(config-if)# mtu bytes
Router(config-if)# no mtu
```

where *bytes* is in the range of 64 through 4470 bytes; and the default is 4470 bytes. (4470 bytes exactly matches FDDI and HSSI interfaces for autonomous switching.) The **no** form of the command restores the default.

### Configuring Framing

The default framing setting is SONET STS-3c. To configure for SDH STM-1, use the following command:

```
Router(config-if)# posip framing-sdh
```

To change back to SONET STS-3c, use the **no posip framing-sdh** command.

### Configuring an Interface for Internal Loopback

To configure an interface for internal loopback, use the following commands:

```
Router(config-if)# loop internal
Router(config-if)# no loop internal
```

Local loopback is useful for checking that the POSIP is working. Packets from router are looped back in the framer.

### Configuring an Interface for Line Loopback

To configure an interface for line loopback, use the following commands:

```
Router(config-if)# loop line
Router(config-if)# no loop line
```

The receive fiber (RX) is logically connected to the transmit fiber (TX) so that packets from the remote router are looped back to it. The incoming data is still received by the local interface.

### Setting the Source of the Transmit Clock

By default, the POSIP uses the recovered receive clock to provide transmit clocking. To specify that the POSIP generates the transmit clock internally, use the following commands:

```
Router(config-if)# posip internal-clock
Router(config-if)# no posip internal-clock
```

### Configuring SONET Payload Scrambling

SONET payload scrambling applies a self-synchronous scrambler ( $x^{43+1}$ ) to the Synchronous Payload Envelope (SPE) of the POS interface to ensure sufficient bit transition density.

---

**Note** Both ends of the connection must use the same scrambling algorithm.

---

To enable SONET payload scrambling on a POSIP, use the **pos scramble-atm** interface command. To disable SONET payload scrambling, use the no form of this command: **no pos scramble-atm**. This command has no keywords or arguments; the default is SONET payload scrambling disabled.

To determine whether SONET payload scrambling is enabled on a POS interface, use the **show startup-config** command; if enabled, the following line is displayed: `pos scramble-atm`.

(Also refer to the section “POSIP Installation Prerequisites,” on page 11, for specific hardware and software requirements for using the SONET payload scrambling feature.)

The following example enables SONET payload scrambling on a POS interface:

```
Router(config)# interface pos 3/0/0
Router(config-if)# pos scramble-atm
Router(config-if)# no shutdown
Router(config-if)# end
```

The following example disables SONET payload scrambling on a POS interface:

```
Router(config)# interface pos 3/0/0
Router(config-if)# no pos scramble-atm
Router(config-if)# end
```

## POSIP Statistics

The POSIP will maintain a count of certain errors. Each POSIP error counter is 32 bits. Errors include the following:

- CRC errors—packet corrupted in transit
- Giants received—packet length too large (greater than 16 kilobytes [KB])
- Runts—packet length too small
- Ignores—no receive buffers available

## Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces.

### Commands That Display POSIP Information

Following are descriptions and examples of the show commands that display POSIP information.

- The **show controllers cbus** command displays the internal status of each interface processor, including the interface processor slot location, the card hardware version, and the currently running microcode version. The **show controllers cbus** command also lists each interface (port) on each interface processor, including the logical interface number, interface type, physical address, and hardware address of each interface. The following example shows a POSIP installed in interface processor slot 0:

```
Router# sh cont cbus
MEMD at 40000000, 2097152 bytes (unused 1888, recarves 3, lost 0)
  RawQ 48000100, ReturnQ 48000108, EventQ 48000110
  BufhdrQ 48000130 (2955 items), LovltrQ 48000148 (10 items, 1632 bytes)
  IpcbufQ 48000150 (24 items, 4096 bytes)
  3570 buffer headers (48002000 - 4800FF10)
  pool0: 16 buffers, 256 bytes, queue 48000138
  pool1: 229 buffers, 1536 bytes, queue 48000140
  pool2: 332 buffers, 4480 bytes, queue 48000158
  pool3: 4 buffers, 4512 bytes, queue 48000160
```

(additional displayed text omitted)

```
slot2: VIP2, hw 2.3, sw 21.44, ccb 5800FF40, cmdq 48000090, vps 8192
  software loaded from flash slot1:muck/biff/vip2_21-44
  FLASH ROM version 255.255
  POS2/0/0, applique is SONET
    gfreeq 48000158, lfreeq 48000168 (4480 bytes), throttled 0
    rxlo 4, rxhi 332, rxcurr 0, maxrxcurr 0
    txq 48001A00, txacc 48001A02 (value 221), txlimit 221
```

- Use the **show interfaces slot/port-adapter/interface** command to discover information about a specific interface in your system. Following is a sample of the **show interfaces slot/port-adapter/interface** command from a Cisco 7513 system with a POSIP installed in chassis slot 2:

```
Router# sh int pos 2/0/0
POS2/0/0 is up, line protocol is up
  Hardware is cyBus Packet over Sonet
  Internet address is 1.1.1.1/27
  MTU 4470 bytes, BW 155000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive not set
  Last input 2d20h, output never, output hang never
  Last clearing of "show interface" counters 2d00h
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    3600000 packets input, 1119432704 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 parity
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 applique, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
```

- Use the **show diagbus slot** command to view specific hardware information for a POSIP installed in your system. Following is an example of the **show diag slot** command for a POSIP installed in chassis slot 2:

```
Router# sh diag 2
Slot 2:
Physical slot 2, ~physical slot 0xD, logical slot 2, CBus 0
Microcode Status 0x4
Master Enable, LED, WCS Loaded
Board is analyzed
Pending I/O Status: None
EEPROM format version 1
VIP2 controller, HW rev 2.4, board revision B0
Serial number: 03514213 Part number: 73-1684-03
Test history: 0x00 RMA number: 00-00-00
Flags: cisco 7000 board; 7500 compatible

EEPROM contents (hex):
0x20: 01 15 02 03 00 35 9F 65 49 06 94 03 00 00 00 00
0x30: 06 3C 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

Slot database information:
Flags: 0x4 Insertion time: 0x1294 (00:13:39 ago)

Controller Memory Size: 32 MBytes DRAM, 1024 KBytes SRAM

PA Bay 0 Information:
POS PA, 1 port
EEPROM format version 1
HW rev 1.5, Board revision A0
Serial number: 00000032 Part number: 73-1803-04
```

- Use the **show version** command to display the configuration of the system hardware (the number of each interface processor types installed), the Cisco IOS software version, the names and sources of configuration files, and the boot images.

```
Router# sh version
Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-M), Released Version 11.1(8)CA [biff 100]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Fri 10-May-96 06:48 by biff
Image text-base: 0x600108A0, data-base: 0x60936000

ROM: System Bootstrap, Version 5.3(16645) [biff 571], INTERIM SOFTWARE
ROM: GS Bootstrap Software (RSP-BOOT-M), Version 11.1(8)CA, RELEASE SOFTWARE (fc2)

Router uptime is 2 minutes
System restarted by power-on
System image file is "dirt/biff/rsp-jv-mz", booted via tftp from 1.1.1.253

cisco RSP2 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
SuperLAT software copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
1 POSIP controller (1 POSI).
1 Packet over Sonet network interface.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 7.
Configuration register is 0x0

(display text omitted)
```

- Use the **show protocols** command to display the global (system-wide) and interface-specific status of any configured Level 3 protocol.
- Use the **show running-config** command to display the currently running POSIP configuration in RAM, as follows:

```
Router# sh running-config
interface posip2/0/0
ip address 1.1.1.3 255.255.255.0
ip route-cache distributed
no keepalive
clock source internal
pos scramble-atm
crc 16
```

### Packet-Over-SONET Error Messages

The only error message you should see would be of the following type and format:

```
%POSIP-0-MSG: %DEBUGGER-0-STACK_DATA8: 00E0 FFFFFFFF 80057F50 00000000
00000000 FFFFFFFF 80032CD4 00000000 00000000
```

---

**Note** You should contact the TAC for assistance with this error message. To contact the TAC, refer to note that follows the section “Cisco Connection Online” on page 45.

---

### POSIP Configuration Example

You define Cisco 7000 series and 7500 series interfaces by interface type and physical slot/port location. The output of the **show interfaces** command displays the logical unit number in the router and the physical slot/port location in the Cisco 7000 series and 7500 series routers. To connect two routers, attach the cable between the Packet OC-3 port on each one. By default, the POSIP uses loop timing mode. To specify that the POSIP generates the transmit clock internally, add the **posip internal-clock** command to your configuration.

---

**Note** For back-to-back operation, at least one of the POSIPs *must* be configured to supply its internal clock to the line.

---

Following is an example of configuration file commands for two routers (each with a POSIP in slot 3) connected back to back through their Packet OC-3 interfaces:

First router:

```
interface POS3/0/0
ip address 1.1.1.1 255.0.0.0
no keepalive
posip internal-clock
```

Second router

```
interface POS3/0/0
ip address 1.1.1.2 255.0.0.0
no keepalive
```

## Upgrading POSIP DRAM and SRAM

The following procedures describe the steps required to upgrade the two DRAM single in-line memory modules (SIMMs) and the one SRAM dual in-line memory module (DIMM) on the POSIP, or to replace the DRAM or SRAM if a system problem has indicated their replacement. Depending on your system configuration and the Cisco IOS your system is running, you might need to upgrade DRAM and SRAM. Following is the available POSIP upgrade product: MEM-POSIP-64MB(=)

The following sections describe upgrading DRAM and SRAM:

- Replacing POSIP DRAM SIMMs
- Replacing the POSIP SRAM DIMM, page 42

### Replacing POSIP DRAM SIMMs

The DRAM on the POSIP is contained in two SIMMs located in sockets U2 and U6. (See Figure 15.) Depending on your system configuration, a memory upgrade might be required. Also, if a system problem is determined to be caused by a SIMM, a SIMM replacement might be required. Use the following procedures to replace the DRAM SIMMs on your POSIP.

---

**Note** Only 60-nanosecond (ns) DRAM SIMMs should be used. A Cisco part number appears on the SIMMs.

---



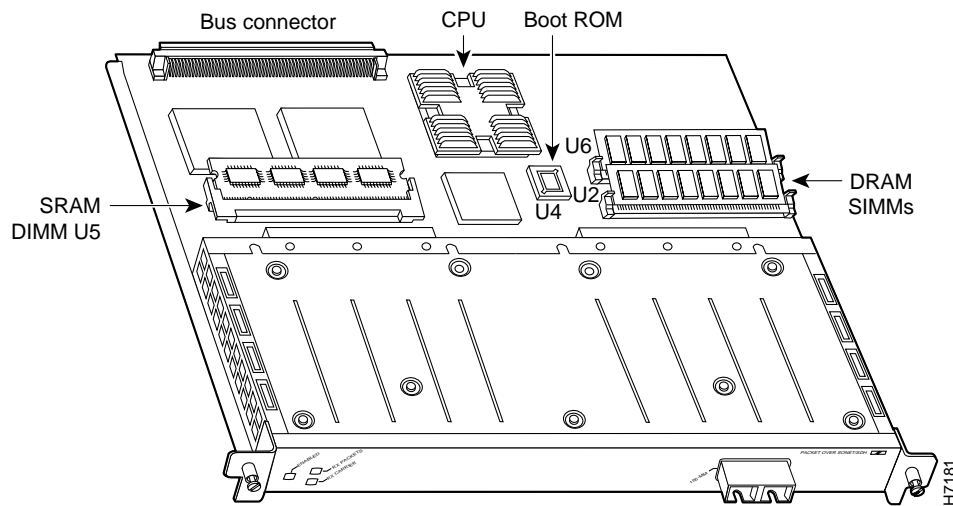
**Caution** To prevent ESD damage, handle SIMMs by the card edges only. (See Figure 17 on page 41.) Place removed SIMMs on an antistatic mat and store them in an antistatic container.

## Removing SIMMs

Follow these steps to remove the existing SIMMs:

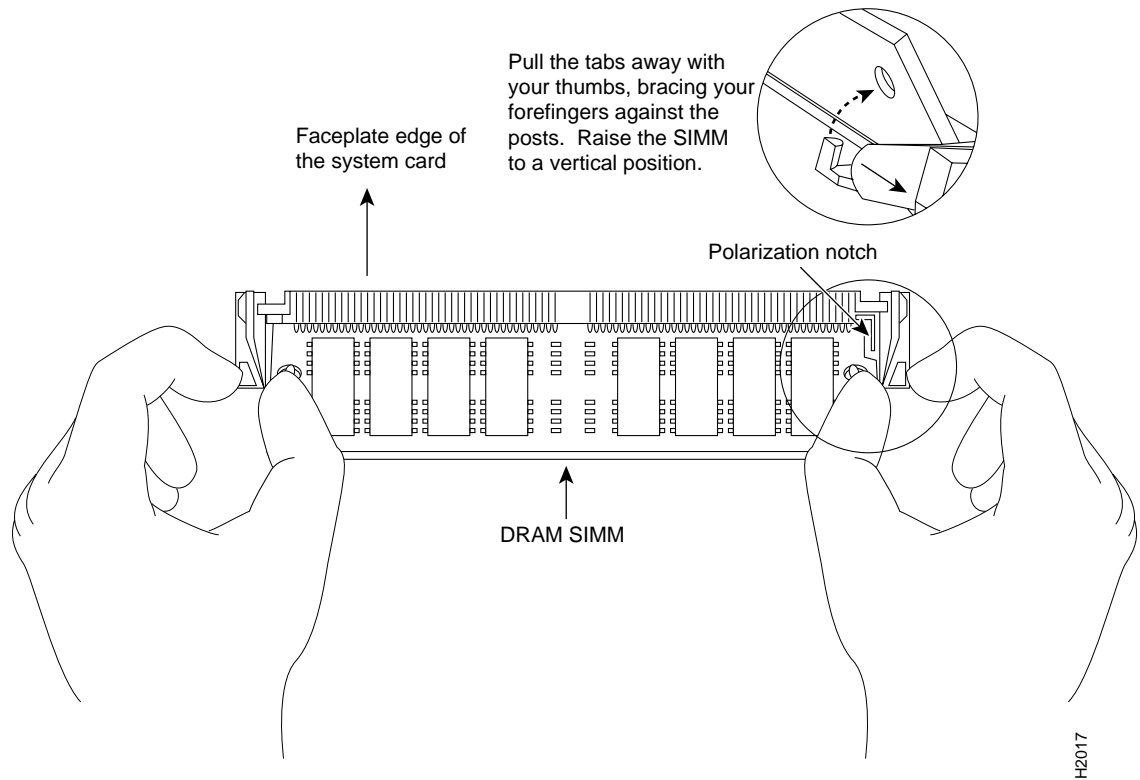
- Step 1** Turn OFF the system power and follow the steps in the section “Removing the POSIP” on page 25.
- Step 2** Place the POSIP on an antistatic mat or pad and ensure that you are wearing an antistatic device, such as a wrist strap. Position the POSIP so that the handle is away from you and the bus connector is toward you—opposite of the position shown in Figure 15.
- Step 3** Locate the SIMMs. The DRAM SIMMs occupy sockets U2 and U6. (See Figure 15.)

**Figure 15** Location of DRAM SIMMs and SRAM DIMM on the POSIP



- Step 4** Release the spring clips from the SIMM that you want to remove and release the SIMM from the socket. (See Figure 16.)

Figure 16 Releasing the SIMM Spring Clips



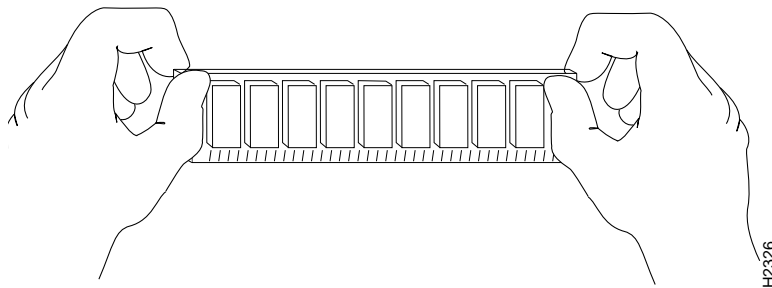
- Step 5** When both ends of the SIMM are released from the socket, grasp the ends of the SIMM with your thumb and forefinger and pull the SIMM completely out of the socket. Handle the edges of the SIMM only; avoid touching the memory module or pins, and the metal traces, or fingers, along the socket edge.
  - Step 6** Place the SIMM in an antistatic container to protect it from ESD damage.
  - Step 7** Repeat Steps 4 through 6 for the remaining SIMM, as required for this replacement.
- This completes the SIMM removal procedure. Proceed to the next section to install the new SIMMs.



## Installing New SIMMs

SIMMs are sensitive components that are susceptible to ESD damage. Handle SIMMs by the edges only; avoid touching the memory modules, pins, or traces (the metal *fingers* along the connector edge of the SIMM). (See Figure 17.)

**Figure 17 Handling a SIMM**



**Caution** To prevent ESD damage, handle SIMMs as shown in Figure 17.

Follow these steps to install the new SIMMs:

- Step 1** With the POSIP in the same orientation as the previous procedure (with the handle away from you and the bus connector toward you), you are going to install the first SIMM in the socket farthest from you. Then you will install the last SIMM in the socket closest to you.
- Step 2** Remove a new SIMM from the antistatic container.
- Step 3** Hold the SIMM component side up, with the connector edge (the metal fingers) closest to you.
- Step 4** Hold the sides of the SIMM between your thumb and middle finger, with your forefinger against the far edge, opposite the connector edge. (See Figure 17.)
- Step 5** Tilt the SIMM to approximately the same angle as the socket and insert the connector edge into the socket.



**Caution** When inserting SIMMs, use firm but not excessive pressure. If you damage a socket, you will have to return the POSIP to the factory for repair.

- Step 6** Gently push the SIMM into the socket until the spring clips snap over the ends of the SIMM. If necessary, rock the SIMM gently back and forth to seat it properly.
- Step 7** Repeat Steps 2 through 6 for the remaining SIMM.
- Step 8** When both SIMMs are installed, check all four alignment holes (two on each SIMM) and ensure that the spring retainer is visible. If it is not, the SIMM is not seated properly. If any SIMM appears misaligned, carefully remove it and reseat it in the socket. Push the SIMM firmly back into the socket until the retainer springs snap into place.

This completes the SIMM replacement procedure. Proceed to the section “Replacing the POSIP SRAM DIMM.”

## Replacing the POSIP SRAM DIMM

The SRAM on the POSIP is contained in a DIMM and located in socket U5. (See Figure 15 on page 39.) Depending on your system configuration, a memory upgrade might be required. Also, if a system problem is determined to be caused by the DIMM, a DIMM replacement might be required. Use the following procedures to replace the SRAM DIMM on your POSIP.

---

**Note** Only a 12-ns SRAM DIMM should be used. A Cisco manufacturing part number appears on the DIMM.

---



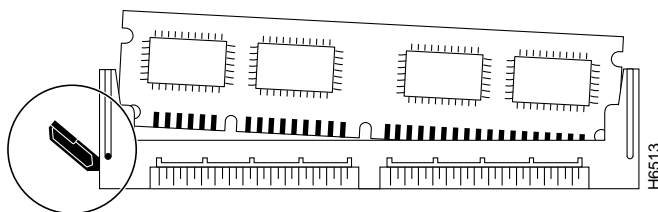
**Caution** To prevent ESD damage, handle the DIMM by the edges only. Place a removed DIMM on an antistatic mat and store it in an antistatic container.

### Removing the DIMM

Follow these steps to remove the existing DIMM:

- Step 1** Turn OFF the system power and follow the steps in the section “Removing the POSIP” on page 25, if required.
- Step 2** Place the POSIP on an antistatic mat or pad, and ensure that you are wearing an antistatic device, such as a wrist strap. Position the POSIP so that the handle is toward you and the bus connector is facing away from you, approximately as shown in Figure 15.
- Step 3** Locate the DIMM. The SRAM DIMM occupies socket U5. (See Figure 15.)
- Step 4** Locate the release lever on the DIMM socket (see circle in Figure 18) and release the DIMM from the socket as shown.
- Step 5** When one end of the DIMM is released from the socket (see Figure 18), grasp the ends of the DIMM with your thumb and forefinger and pull the DIMM completely out of the socket. Handle the edges of the DIMM only. (See Figure 19.)

**Figure 18** Releasing the SRAM DIMM



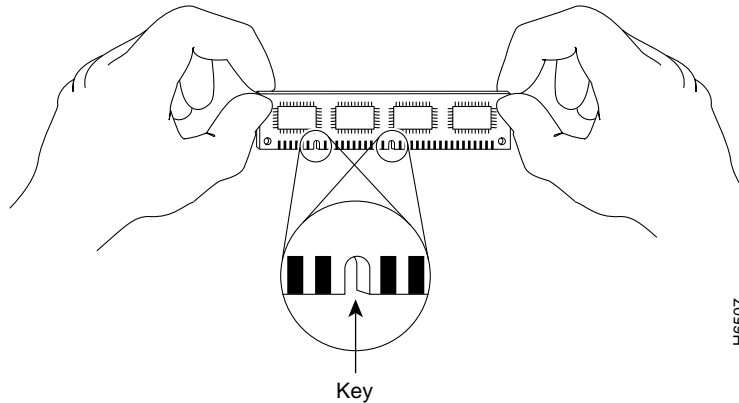
- Step 6** Place the DIMM in an antistatic container to protect it from ESD damage.

This completes the DIMM removal procedure. Proceed to the next section to install the new DIMM.

## Installing a New DIMM

The DIMM is sensitive component that is susceptible to ESD damage. Handle the DIMM by the edges only; avoid touching the memory modules, pins, or traces (the metal *fingers* along the connector edge of the DIMM). (See Figure 19.)

**Figure 19** Handling an SRAM DIMM



**Caution** To prevent ESD damage, handle the DIMM as shown in Figure 19.

Follow these steps to install the new DIMM:

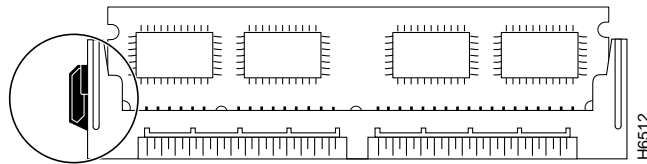
- Step 1** With the POSIP in the same orientation as the previous procedure (with the handle toward you and the bus connector away from you), you will install the DIMM in socket U5.
- Step 2** Remove the new DIMM from the antistatic container.
- Step 3** Hold the DIMM component side up, with the connector edge (the metal fingers) down. (See Figure 19.) Hold the sides of the DIMM between your thumb and fore finger.
- Step 4** Tilt the DIMM to approximately the same an angle as the socket and insert the connector edge into the socket. Note the two notches (keys) on the connector edge of the DIMM. (See Figure 19.) These keys are intended to assure correct orientation of the DIMM in the socket.



**Caution** When inserting the DIMM, use firm but not excessive pressure. If you damage a socket, you will have to return the POSIP to the factory for repair.

- Step 5** Note the orientation of the socket key on the SRAM DIMM and the DIMM socket and gently push the DIMM into the socket until the release lever is flush against the side of the DIMM socket (see Figure 20) and the DIMM's edge connector is fully inserted. If necessary, rock the DIMM gently back and forth to seat it properly.

**Figure 20** Installing an SRAM DIMM in the Socket



- Step 6** When the DIMM is installed, check that the release lever is flush against the side of the DIMM socket. (See Figure 20.) If it is not, the DIMM might not be seated properly. If the DIMM appears misaligned, carefully remove it according to the removal procedure, and reseat it in the socket. Push the DIMM firmly back into the socket until release lever is flush against the side of the DIMM socket.

This completes the DIMM replacement procedure.

To replace the POSIP in your system, refer to the section “Installing a New or Replacement POSIP and Connecting Interface Cables” on page 26.

## Checking a DRAM and SRAM Replacement

If, after a DRAM or SRAM replacement, the system fails to boot properly, or if the console terminal displays a checksum or memory error, check the following:

- Ensure that all SIMMs (and the DIMM) are installed correctly. If necessary, shut down the system and remove the POSIP. Check the SIMMs (and the DIMM) by looking straight down on them and then at eye level. The SIMMs (and the DIMM) should be aligned at the same angle and the same height when properly installed. If a SIMM (or DIMM) appears to stick out or rest in the socket at a different angle from the others, remove it and reinsert it. Then replace the POSIP and reboot the system for another installation check.
- Each DRAM SIMM socket must contain SIMMs of the same size and speed or the system will not operate. SIMMs must be 60 ns or faster. The speed is silkscreened along one edge of the SIMM.

Refer to the section “Checking the Installation,” on page 28, as required. If after several attempts the system fails to restart properly, contact a service representative for assistance. Before you call, make note of any error messages, unusual LED states, or any other indications that might help solve the problem.

## Cisco Connection Online

Cisco Connection Online (CCO) is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional information and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously: a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and it is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: <http://www.cisco.com>
- WWW: <http://www-europe.cisco.com>
- WWW: <http://www-china.cisco.com>
- Telnet: [cco.cisco.com](http://cco.cisco.com)
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact [cco-help@cisco.com](mailto:cco-help@cisco.com). For additional information, contact [cco-team@cisco.com](mailto:cco-team@cisco.com).

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**Note** If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or [tac@cisco.com](mailto:tac@cisco.com). To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or [cs-rep@cisco.com](mailto:cs-rep@cisco.com).

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This document is to be used in conjunction with the router installation and configuration guide that shipped with your router. (3330posi.fm[78-3330-05])

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