Doc. No. 78-1191-02

FSIP Upgrade Kit Instructions

Cisco Product Number: UPG-FSIP4, UPG-FSIP8

This document provides instructions for replacing serial interface processors (SIPs or PRE-FSIPs) with fast serial interface processors (FSIPs) in the Cisco 7000. The instructions also include procedures for returning the SIPs to the factory, and basic configuration commands and guidelines for making any necessary configuration changes to the serial interfaces. For complete descriptions of interface subcommands and the configuration options available for serial interfaces, refer to the related software documentation.

The sections in this document include the following:

These upgrade instructions contain references to other publications, all of which are included in your upgrade kit. Before beginning the upgrade, ensure that you have the following documents available:

- *Fast Serial Interface Processor (FSIP) Installation and Configuration*, Doc. No. 78-1147-02
- *Upgrading Software and Microcode in Cisco 7000 Series Routers*, Doc No. 78-1144-05
- *Router Products Release Notes for Software Release 9.17*, Doc No. 78-1112-07
- *Router Products Configuration and Reference Addendum*, Doc No. 78-1195-06

Caution Some steps in this upgrade procedure require that you shut down the entire router for a short time while removing SIPs and performing any necessary system upgrades. We recommend that you read this entire document before proceeding and become familiar with the procedures and requirements to minimize the amount of time the interfaces are not available.

FSIP Upgrade Overview

This section describes the FSIP upgrade and the differences between the SIP and FSIP. For a complete description of the Cisco 7000 and the FSIP, refer to the accompanying document, *Fast Serial Interface Processor (FSIP) Installation and Configuration* (Document Number 78-1147-02), or to the *Cisco 7000 Hardware Installation and Maintenance* publication that you received with your router.

Procedural Overview

Following are the basic tasks that you will perform to complete this upgrade. Some tasks, such as upgrading the system software or SP microcode, are not required if your router already meets the minimum system requirements, which are described in "Prerequisites for FSIP Installation" on page 5.

To complete this upgrade, you will perform some or all of the following tasks:

1. Verify the contents of the upgrade kit.
2. Use **show** commands to display the current versions of system software and microcode and to record the configuration and status of each serial interface.
3. Verify that your system is currently running System Software Release 9.17(5) and SP Microcode Version 1.4. If your system is running an earlier version of the software or SP microcode, you will follow the instructions in the companion document, *Upgrading Software and Microcode in Cisco 7000 Series Routers* (Doc. No. 78-1144-05), to upgrade them as follows:
   - To upgrade the system software to Release 9.17(5), you will download the image from a floppy disk (included in the upgrade kit) to a TFTP server, then copy the new image into Flash memory.
   - To upgrade the SP microcode to Version 1.4, you will replace the microcode ROM on the SP (a replacement ROM with SP 1.4 is included in the upgrade kit). The SP 1.4 image must reside in ROM; it cannot load from a Flash file or the router may fail to boot properly.
4. Shut down all serial interfaces.
5. Turn off the router system power (the router must be shut down completely).
6. Remove the first SIP from the chassis.
7. Install a new FSIP in the vacated slot.
8. Pack the removed SIP in the antistatic bag and shipping carton from which you removed the first FSIP.
9. Repeat tasks 6 through 8 for each FSIP you received.
10. Remove any remaining SIPs and install blank carriers in the vacated slots.
11. Pack the remaining SIPs in the antistatic bags and shipping cartons from which you removed the blank IP carriers.
12. Restart the router and verify that all IPs, including all new FSIPs, are functioning properly.
13. Use configuration commands to make any necessary changes to the serial interfaces, such as reassigning some interfaces to different slot/port locations. When replacing two four-port SIPs with one eight-port FSIP, install the new FSIP in the same interface slot as one of the SIPs you remove; the FSIP will recognize the four SIP interfaces. However, you will have to reassign the interfaces from the second SIP to the new slot/port addresses of the lower four FSIP ports.
14. Pack up all SIPs and return them to Cisco Systems.

FSIP Upgrade Program

The FSIP replaces the SIP (also called the PRE-FSIP) in the Cisco 7000 product line. When the Cisco 7000 was introduced in January 1993, the FSIP was planned but not yet developed. The SIP was released as an interim solution until the FSIP was available. By purchasing a SIP or PRE-FSIP, you effectively purchased an FSIP and received one or more SIPs to provide serial interface support until the FSIP development and testing were completed. Effective with the FSIP release in early October 1993, the SIP is no longer orderable in most countries. No new microcode will be released for the SIP, nor will the SIP support any future upgrades or enhancements. In addition, future system software upgrades are not guaranteed to interoperate with the SIP.

As part of the FSIP Upgrade Program, surveys were sent to all SIP owners requesting shipping information and the types of interface cables needed. Cisco Systems is fulfilling and shipping upgrade kits in first-in-first-out order as we receive the completed survey forms (provided there are no regulatory compliance restrictions imposed by the destination country). Each upgrade kit contains replacement FSIPs with the same total number of ports as those on your current SIPs. (Because FSIPs support up to eight ports and the SIP supports a maximum of four, you may receive one eight-port FSIP as a replacement for two four-port SIPs.) Each FSIP includes one interface cable per port of the interface types you specified in the survey. In addition, because the SIP and FSIP port adapters are not interchangeable, you will receive equivalent FSIP replacements for any SIP port adapters that you purchased as spares. Cable spares are not covered in this upgrade program.

The entire upgrade kit is free of charge; however, you must return the SIPs (and any spares that are replaced) within 30 days from the upgrade kit shipment date (60 days for kits shipped outside the U.S.) or you will be invoiced for any outstanding equipment. (Cable spares are not included in the no-cost upgrade, so you do not have to return any SIP cables you have purchased as spares.) For shipping instructions, refer to “Returning SIPs to the Factory” on page 20.

Functional Differences between SIP and FSIP

The FSIP supports more interfaces and higher transmission speeds than the SIP. However, there are additional differences that are important to note. Table 1 lists the differences that are most significant to network technicians and administrators:

SIP port adapters and cables cannot be used with the FSIP. Each SIP port adapter provides a single interface port, and each interface types uses a different connector scheme (15- or 25-pin male or female). SIP interface cables are interface- and mode-specific, and can connect only to SIP ports of the same interface type. Each FSIP port adapter supports two interface ports, and all ports use an identical, 60-pin universal receptacle. FSIP interface cables are also interface- and mode-specific, but can connect to any FSIP port. Figure 1 shows all four SIP interface types and the universal FSIP interface port.

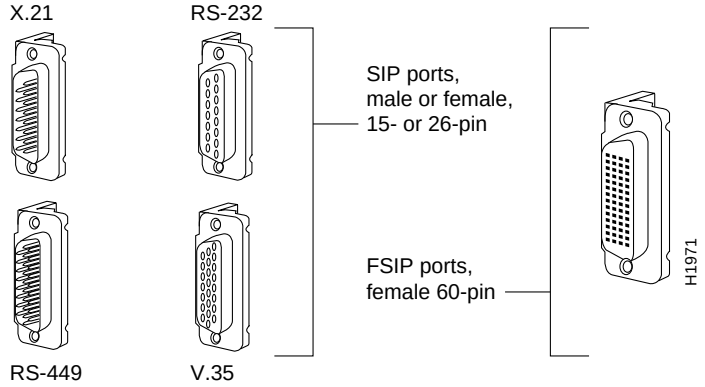

Figure 1 SIP and FSIP Ports

Table 1 Physical and Functional Differences between the FSIP and SIP

Feature/Capability	FSIP	SIP
OIR	Yes; supports OIR	No OIR support: system shutdown required to remove/replace
Max. no. of ports	8	4
Max. configuration	8-port: 8 T1 or 6 E1 interfaces 4-port: 4 T1 or 3 E1 interfaces	4 T1 interfaces
Interface types available/supported	RS-232, RS-449, V.35, X.21, and RS-530	RS-232, RS-449, V.35, and X.21 (no RS-530 support)
Interface ports (see Figure 1)	60-pin universal; change interface type by replacing interface cable	Interface-specific; change interface type by replacing port adapter
Timing signals	Supports internal clock signal (for DCE mode) automatically	Require configuration command (**transmit-clock-internal**) to specify internal clocking for DCE mode
Half-duplex support	Currently not supported; available in a future maintenance release	Support on RS-232 interface only; requires a jumper change on RS-232 port adapter
Error correction	16-bit or 32-bit CRC, software settable	16-bit CRC only
System software compatibility	Requires Release 9.17(5) or later and SP 1.4 microcode or later	Supported in all releases through 9.17(5); not guaranteed to operate with later releases
Displaying interface information	Use **show controllers cxbus** command	Use **show controllers serial** command

Caution SIP and FSIP serial interface cables and port adapters are not interchangeable. Attempting to force a SIP cable (which uses DB-15 or DB-25 plugs) into the FSIP universal 60-pin receptacle can damage the FSIP.

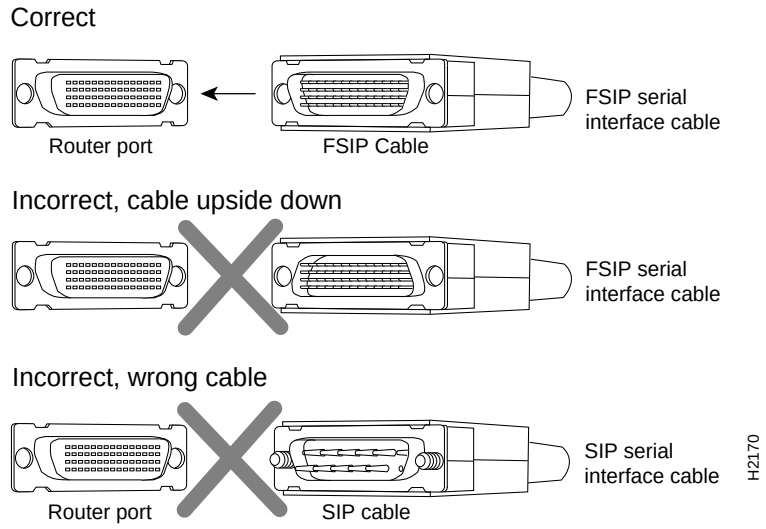

Figure 2 SIP and FSIP Cables are Not Interchangeable

Upgrade Prerequisites

Before you begin this upgrade, ensure that your existing system software and microcode meet the compatibility requirements; otherwise, you will need to upgrade them (upgrade images are included in the upgrade kit). Also review the list of parts and tools you will need to perform the various tasks, and the safety and ESD-prevention guidelines for avoiding bodily injury or equipment damage.

Prerequisites for FSIP Installation

The FSIP is compatible with any Cisco 7000 that is running the following software and microcode:

- Software Release 9.17(5) or later (the system software image can load from either the default ROMs or from a Flash memory file).
- SP microcode is Version 1.4 (SP1-4), which must load from the SP microcode ROM (SP1-4 is not available on floppy disk, and therefore should not be loaded from a Flash memory file).

Although multiple microcode versions for a specific interface type can be stored concurrently in Flash, only one image can load at startup. The **show version** command displays the current hardware configuration of the router, including the system software version that is currently loaded and running. The **show controllers cxbus** command displays the currently loaded and running microcode version for the SP and for each IP. The **show configuration** command shows the current instructions for loading software and microcode at startup.

Use the **show version** command to display the currently running system software version. The following example shows System Software is Release 9.17(5), which is required for FSIP compatibility. The 9.17(5) image can load from either a Flash file or from ROM; both are compatible with the FSIP.

```
Router> show version

GS Software (GS7), Version 9.17(5)
Copyright (c) 1986-1993 by cisco Systems, Inc.
Compiled Mon 09-Aug-93 01:16

System Bootstrap, Version 4.6(1)

Current date and time is Fri 2-26-1993 2:18:52
Boot date and time is Fri 1-29-1993 11:42:38
Router uptime is 3 weeks, 6 days, 14 hours, 36 minutes
System restarted by power-on
Running default software
Network configuration file is "Router", booted via tftp from 131.108.2.333
```

Use the **show controllers cxbus** command to display the microcode version of the SP. The following example shows that the running SP microcode is Version 1.4, which is required for FSIP compatibility. The SP 1.4 microcode image *must* reside in ROM; if the SP microcode ROM contains a microcode version earlier than 1.4, and version 1.4 is loading from a Flash file, the router may fail to boot properly. (In this example, ROM Version 1.4 is assumed because it is not available on floppy disk and, therefore, it should not be stored in Flash memory.)

```
Router# show controllers cxbus

Switch Processor 5, hardware version 11.1, microcode version 1.4
  (text omitted from example)
```

If you suspect that the SP 1.4 image may be loading from a Flash file, check the contents of Flash memory to ensure that it does not contain an SP 1.4 image. (The procedure for checking the contents of Flash memory follows). You can also use the **show configuration** command to display the contents of the configuration file to ensure that it does not contain instructions to load the SP microcode from a Flash file. If the configuration file does not contain any special instructions for loading SP microcode, then the system is loading the microcode from ROM.

If the displays indicate that the running system software is earlier than Software Release 9.17(5), check the contents of Flash memory to determine whether the 9.17(5) image is available. (If the 9.17(5) images is already stored in Flash but the default (older) image is still loading from ROM, you can use configuration commands to instruct the system to download the correct image before you install the new FSIP.) The **show flash** command displays a list of all files stored in Flash memory. The following example shows that FIP Microcode Version 1.1 and SP Microcode Version 1.2 are stored in Flash, but that there is no system software image available.

```
Router# show flash
4096K bytes of flash memory on embedded flash (in RP1).

file     offset     length        name
  0     0x80        53364       eip1-0
  1     0xD134      55410       sp140-43
  [4085336/4194304 bytes free]
Router#
```

If System Software Version 9.17(5) and SP Microcode Version 1.4 are not already installed and available on your system, you will have to upgrade. At the appropriate point in this upgrade procedure, you will refer to the companion document, *Upgrading Software and Microcode in Cisco 7000 Series Routers*, Doc. No. 78-1144-05, for instructions.

Startup Error Message

When the system starts up, it looks for boot instructions in the system configuration file and hardware configuration register. These instructions cause the system to boot from either the default ROM software, or from an image stored in Flash memory, or from a remote server. Because the system must be able to retrieve and interpret these instructions before it can execute them, it always performs a partial boot from the default ROMs first and, after retrieving the instructions, it executes them and reboots if necessary. This partial boot is usually transparent to the user; however, it may generate a harmless error message if the system ROMs contain a software version earlier than 9.17(5).

System Software Release 9.17(5) supports the FSIP, but earlier releases will not recognize it. If the software ROMs in your system contain software release 9.17(4) or earlier, the initial partial boot from that ROM image can cause the following message to be displayed:

```
%UCODE-3-LDFAIL: Unable to download ucode FSIPn-n in slot 0, installed ucode loaded
must be a SIP serial interface
Booting gs7-k...
```

This message will be displayed at each subsequent system startup (unless you remove the FSIP or replace the system software ROMs with 9.17(5) or later ROMs), but does not indicate a problem and should be ignored.

Slot/Port Addresses

The SIPs support a maximum of four interfaces; the FSIPs support either four or eight. If you purchased an eight-port FSIP, you will currently have two SIPs installed, each of which supports four interfaces. Because the eight-port FSIP will now support all eight interfaces, your upgrade kit will contain one eight-port FSIP and one blank IP carrier.

If you remove a SIP and install an FSIP in the same slot, the new FSIP will recognize the four serial interfaces from the SIP. If you replace two four-port SIPs with one eight-port FSIP, you will have to reassign the interfaces from the second SIP to new slot/port addresses on the FSIP.

Table 2 shows an example of how the interface slot/port addresses should be reassigned from two four-port SIPs to a single eight-port FSIP. The SIP in slot 0 is replaced by the FSIP, and the SIP in slot 1 is replaced by a blank IP carrier.

Table 2 Reassigning Interface Slot/Port Locations from Two SIPs to One FSIP

	Before FSIP Installation		After FSIP Installation	
Serial Interface	**Slot 0, SIP**	**Slot 1, SIP**	**Slot 0, FSIP**	**Slot 1, blank**
First serial interface	Serial 0/0		Serial 0/0	
Second serial interface	Serial 0/1		Serial 0/1	
Third serial interface	Serial 0/2		Serial 0/2	
Fourth serial interface	Serial 0/3		Serial 0/3	
Fifth serial interface		Serial 1/0	Serial 0/4	
Sixth serial interface		Serial 1/1	Serial 0/5	
Seventh serial interface		Serial 1/2	Serial 0/6	
Eighth serial interface		Serial 1/3	Serial 0/7	

If you are using several different interface types, or if you want to ensure that you keep the interfaces in approximately the same sequence or locations on the new FSIPs as they are on the SIPs, record the types of interfaces or the slot/port locations before you shut down the interfaces. Use the worksheet in Table 3, or use the **write network** command to write your current configuration to a remote host (from which you can print or view the configuration later) to record the current configuration and plan the new locations on the FSIPs you will install.

Table 3 Worksheet for Interface Port Types and Locations

	Slot 0		Slot 1		Slot 2		Slot 3		Slot 4	
	SIP	**FSIP**	**SIP**	**FSIP**	**SIP**	**FSIP**	**SIP**	**FSIP**	**SIP**	**FSIP**
Port 0										
Port 1										
Port 2										
Port 3										
Port 4										
Port 5										
Port 6										
Port 7										

List of Tools and Parts

You need the following tools to remove the SIPs from the chassis and install the FSIPs:

- No. 1 Phillips or 3/16-inch flat-blade screwdriver for the captive installation screws on the IPs (the first few hundred IP carriers manufactured used Phillips-head screws; those manufactured later use slotted screws)
- Your own ESD-prevention equipment or the disposable strap included with the upgrade kit

You need the following parts to complete this upgrade and to return the replaced equipment to Cisco Systems. Verify that you received all of the following parts in your upgrade kit:

- Replacement FSIPs with the same *total* number of ports as the total number of SIP ports currently installed in your router. You may receive one eight-port FSIP to replace two four-port SIPs.
- One blank IP carrier with each eight-port FSIP (to fill the slot left empty by the second SIP).
- One serial port adapter cable for each FSIP port.
- One dual-port universal FSIP port adapter for every two SIP port adapter spares that you have on hand. (Each FSIP port adapter provides 2 interface ports; each SIP port adapter provides 1 port.)
- Packing materials with which to return the removed equipment to Cisco Systems, which include:
  - One antistatic bag and one shipping box for each SIP that you will return. Reuse the FSIP boxes and packing materials.
  - Three address labels, addressed to Cisco Systems.
  - Waybills for DHL and Federal Express.
  - Shipping instructions, including sample Pro-Forma invoices in case they are needed for international shipments The shipping instructions are duplicated at the end of this document.

Safety

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

Electrical Equipment

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

Telephone Wiring

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 (ESD) Damage

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. The FSIP 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, use a preventive antistatic strap whenever handling the FSIP. Handle the carriers by the handles and the carrier edges only; never touch the boards or connector pins.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to a captive installation screw on an installed power supply. (See Figure 3.)
- When installing an FSIP, use the ejector levers to properly seat the bus connectors in the backplane, then tighten both (top and bottom) captive installation screws. These screws prevent accidental removal, provide proper grounding for the system, and they help to ensure that the bus connectors are seated in the backplane.
- Handle carriers by the handles and edges only; avoid touching the board or any connector pins.
- Place a removed FSIP board-side-up on an antistatic surface or in a static shielding bag. If the component will be returned to the factory, immediately place it in a static shielding bag.

Figure 3 Placement of ESD Wrist Strap

- When removing an FSIP, use the ejectors to release the bus connectors from the backplane. Hold the handle on the front of the FSIP 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 it straight out of the slot.
- Avoid contact between the FSIP 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 within the range of 1 and 10 Mohms.

Caution All CxBus IPs (FSIP, EIP, TRIP, FIP, and HIP) support OIR. However, you must shut down the system before removing the RP, SP or SIP. The system cannot operate without both an RP and an SP installed; removing either one will cause an immediate system crash, and may lose or damage memory files on the RP. The SIP will cause a reboot if removed on line and, although it should not cause damage, it was not designed to support OIR. Therefore, we recommend that you shut down before removing a SIP.

Replacing SIPs with FSIPs

This section describes the procedures for replacing existing SIPs with new FSIPs. Although the OIR feature allows you to install and remove FSIPs without shutting down interfaces, you will have to shut down the existing SIP serial interfaces before you remove the SIPs from the chassis. If you remove a SIP and install an FSIP in the same slot, the new FSIP will recognize the serial interfaces from the SIP. If you replace two four-port SIPs with one eight-port FSIP, you will have to reassign the interfaces to the new slot/port addresses on the FSIP. (See “Slot/Port Addresses” on page 7.)

Each unused IP slot contains a blank IP carrier to keep dust out of the chassis and to maintain proper air flow through the IP compartment. If you are replacing two four-port SIPs with one eight-port FSIP, your upgrade kit includes a blank IP carrier for the slot that will remain empty.

Upgrading the System Software and SP Microcode

If your system software and microcode meet the prerequisites described in “Upgrade Prerequisites” on page 5, skip this section and proceed to “Shutting Down the Serial Interfaces” on page 11.

If either your system software or SP microcode are not at the required minimum versions, you must upgrade before proceeding. Refer to the accompanying document, *Upgrading Software and Microcode in Cisco 7000 Series Routers* (Document No. 78-1144-05), to perform the appropriate upgrade:

- To upgrade the system software to 9.17(5), refer to the instructions in “Upgrading from Floppy Disks or TFTP Servers” on page 3 to upgrade the 9.17(5) image from floppy disk (this software release is not available on replacement ROMs).
  - If the router has been booting from ROM (and not from a Flash file), refer to “Changing the Boot Instructions” on page 32 to change the configuration register jumper from the default setting (boot from ROM) to boot from a filename. (Placing the jumper on bit 0 of the boot field causes the system to boot from ROM and ignore instructions in the configuration file; moving the jumper to bit 1, 2, or 3 allows the system to follow the boot instructions in the configuration file at startup, such as an instruction to boot a system image from a specific file in Flash memory.)

  - Follow the instructions in "Booting from Flash Memory" on page 19 to edit the boot instructions in the configuration file and enter the filename of the new image to boot at startup.
  - Issue the **reload** command to restart the router, then use the **show version** command to ensure that the new 9.17(5) image is loaded and running. (See page 5.) If it is not, repeat the preceding procedures.
- To upgrade the SP microcode to Version 1.4, refer to "Upgrading Software and Microcode with Replacement ROMs" on page 22 of the upgrade document.
  - Follow the instructions in "Upgrading Microcode ROMs" on page 34 to replace the SP microcode ROM (SP Microcode Version 1.4 is not available on floppy disk; the microcode image must reside in ROM or the router may fail to boot properly if an FSIP is installed).
  - Follow the instructions in "Verifying the Microcode Version" on page 37 to verify that SP1-4 is the currently-running SP microcode version. If it is not, follow the instructions to edit the configuration file so that the system loads the SP microcode from ROM and not from a Flash file at startup.
  - Issue the **microcode reload** command to reload only the microcode without restarting the router, then issue the **show controller cxbus** command to ensure that SP1-4 is loaded and running. (See page 5.) If it is not, repeat the preceding tasks.

When your system is running the minimum required system software and SP microcode, proceed to the next section to begin the replacement.

Shutting Down the Serial Interfaces

Because the SIPs do not support OIR, removing a SIP when the system is operating can cause a soft system reboot. Removing more than one SIP within 15 seconds (before the router restarts completely) can cause a system error. Therefore, shutting down the router completely to remove the SIPs will help avoid problems on other interfaces that could result from the router restarting several times in a short period of time.

Also, unless you will replace each existing SIP with a four-port FSIP in exactly the same slot, you should shut down all serial interfaces before replacing the SIPs to avoid problems with slot/port addresses when the new FSIPs are installed. If you are installing new FSIPs in exactly the same slots as the existing SIPs, you do not need to shut down the interfaces; the FSIPs will recognize the serial interfaces when the system restarts and bring them up in the same configuration as they were on the SIP. You must have access to the privileged level of the EXEC command interpreter to shut down the interfaces; contact your network administrator for a password or additional information.

Follow these steps to shut down the existing serial interfaces:

Step 1 Enter the privileged level of the EXEC command interpreter (this usually requires a password).

```
Router> enable
Password:
Router#
```

Step 2 Enter the configuration mode and shut down each interface on the SIP or SIPs that you will remove. A sample of the command sequence to shut down an interface follows:

```
Router# configure terminal

int serial 1/0
shutdown
```

Step 3 When all interfaces are entered, press control-Z (^Z) to exit the configuration mode, then save the configuration by writing it to NVRAM (**write memory**).

```
int serial 1/3
shutdown
^Z

Router# write memory
[OK]
Router#
```

Step 4 Use the **show interfaces** or **show configuration** command to ensure that all of the SIP interfaces are shut down. The output of the **show interfaces** command displays the states of all interfaces in the router. Following is a sample of the **show configuration** command output:

```
Router# show config

(display text omitted)
interface Serial0/0
ip address 131.106.123.4 255.255.255.0
shutdown
!
interface Serial0/1
no ip address
shutdown
(display text omitted)
```

Removing SIPs and Installing FSIPs

Ensure that you have blank IP fillers available for each slot that will be empty. For each four-port SIP in your router, you should receive one four-port FSIP *or* one eight-port FSIP and one blank IP carrier. (See “Slot/Port Addresses” on page 7.)

As you remove each SIP (or pair of SIPs if installing eight-port FSIPs), immediately place an FSIP in the same slot. If you are replacing four SIPs with two eight-port FSIPs, place the FSIPs in every other slot (it will be easier to reassign the interfaces to the new slot/port addresses on the FSIP). After installing all FSIPs, install a blank IP carrier in each IP slot that remains empty.

Figure 4 shows proper handling of an IP during installation. Figure 5 shows the functions of the ejector levers. After loosening the captive installation screws at the top and bottom of the IP faceplate, always use the ejector levers to release an IP from the backplane. When installing an IP in a slot, use the ejector levers to properly seat the IP in the backplane. Pushing or slamming the IP all the way into the slot with the handle can damage the backplane or board connectors.

Figure 4 Handling an IP During Installation

Note Do not discard the FSIP packaging. After installing a new FSIP, place the removed SIP in the antistatic bag and shipping box for return to Cisco Systems.

After you ensure that all serial interfaces are shut down (if necessary), follow these steps to remove the SIPs from the router and install the replacement FSIPs:

Step 1 Disconnect all serial port adapter cables from the SIP ports. Bundle the cables and put them aside for return to the factory. Avoid getting the SIP interface cables mixed up with the new interface cables for the FSIP ports; the SIP cables cannot be used with the FSIP.

Step 2 Shut down the system by turning all power supplies OFF.

Figure 5 Ejector Levers and Captive Installation Screws

Step 3 Use a screwdriver to loosen the captive installation screws at the top and bottom of the SIP.

Step 4 Place your thumbs on the upper and lower ejectors and simultaneously push the top ejector up and the bottom ejector down to release the SIP from the backplane connector. (See Figure 5c.)

Step 5 Grasp the SIP handle with one hand and place your other hand under the carrier to guide the SIP out of the slot. (See Figure 4.) Carefully pull the SIP straight out of the slot, keeping your other hand under the carrier to guide it. Keep the bottom of the carrier at a 90-degree orientation to the backplane.

Step 6 Place the removed SIP on an antistatic mat or foam or, if one is available, into an antistatic bag.

Step 7 Remove a new FSIP from the shipping package. Do not discard the shipping materials. Handle the antistatic bag and shipping box carefully; you will need these materials to pack the SIPs for return to the factory.

Step 8 Holding the FSIP handle with one hand, with your other hand under the carrier to support the FSIP and guide it into the slot, place the back of the FSIP in the empty IP slot and align the notch on the bottom of the carrier with the groove in the slot. (See Figure 5a.)

Step 9 While keeping the FSIP at a 90-degree orientation to the backplane, carefully slide the FSIP into the slot until the back of the faceplate makes contact with the ejector levers, then *stop*. (See Figure 5b.)

Caution Always use the ejector levers when installing or removing processor modules. A module that is partially seated in the backplane when the system is operating will cause the system to hang and subsequently crash, and shoving or slamming the IP into the slot can damage the backplane and connector pins.

Step 10 Using the thumb and forefinger of each hand to pinch each ejector, simultaneously push the top ejector down and the bottom ejector up until both are at a full 90-degree orientation to the faceplate. (See Figure 5c.)

Step 11 Use a screwdriver to tighten the captive screws on the top and bottom of the IP faceplate to prevent the IP from becoming partially dislodged from the backplane and to ensure proper EMI shielding. (These screws must be tightened to meet EMI specifications.)

Step 12 Repeat steps 3 through 11 to install any additional FSIPs until all new FSIPs are installed.

Step 13 Repeat steps 3 through 11 to remove any remaining SIPs and replace each with a blank IP carrier (instead of an FSIP). No slots should be empty; all IP slots should contain an IP or a blank IP carrier.

Step 14 Attach the appropriate FSIP serial port adapter cable between each FSIP interface port and a DSU or other network connection device. Refer to the worksheet in Table 3 if you completed it before shutting down the interfaces.

Caution SIP serial port adapter cables are not compatible with the FSIP. Do not attempt to connect SIP cables to the FSIP ports, or you might damage the cable or FSIP port connectors.

Step 15 Check all captive installation screws to ensure that all FSIPs are completely seated in their slots, then proceed to the next section to restart the router and check the installation.

Caution Do not operate the router unless all IP slots contain either an IP or a blank IP carrier. An empty slot violates the EMI integrity of the system, allows dust and other contaminants to enter the chassis interior, and allows cooling air to escape freely through the cutouts in the carrier faceplate, which can misdirect the airflow inside the chassis and allow components on other boards to overheat.

Checking the Installation

After you install all new FSIPs, restart the router and verify the installation by observing the LED states and the console display. After the system discovers and enables all IPs, the Enabled LED on the FSIPs and on all IPs should light. The console screen will display system startup banner and hardware configuration of the system, which is similar to the **show version** display output.

If the system software ROMs in your system contain Software Release 9.17(4) or earlier, they will not recognize the FSIP interface; support for the FSIP is provided with 9.17(5) and later software. At system startup, even if the system is configured to boot Software Release 9.17(5) from a Flash file, the system *partially* boots with the default ROMs before executing its boot instructions. If the ROM software does not recognize the FSIP, it will print one or more messages similar to the following:

```
%UCODE-3-LDFAIL: Unable to download ucode FSIPn-n in slot 0, installed ucode loaded
must be a SIP serial interface
Booting gs7-k...
```

This message will be displayed at each subsequent system startup (unless you remove the FSIP or replace the system software ROMs with 9.17(5) or later ROMs), but does not indicate a problem and should be ignored.

Verify that the FSIP is installed correctly as follows:

Step 1 Ensure that a console terminal is connected to the RP *Console* port and that the console terminal is turned ON.

Step 2 Turn ON all power supplies to restart the router.

Step 3 Verify that the console displays the system startup banner and, when the system startup is complete, that the system configuration displayed on the console reflects all new FSIPs.

```
GS Software (GS7), Version 9.17(5)
Copyright (c) 1986-1993 by cisco Systems, Inc.
Compiled Mon 21-Jun-93 08:37

System Bootstrap, Version 4.6(1) [fc2], SOFTWARE

Current date and time is Wed 10-6-1993 3:27:29
Boot date and time is Sat 8-21-1993 13:54:01
router uptime is 6 weeks, 3 days, 13 hours, 34 minutes
System restarted by power-on
System image file is "gs7-k.917-5.1", booted via flash

RP1 (68040) processor with 16384K bytes of memory.
X.25 software, Version 2.0, NET2 and BFE compliant.
Bridging software.
1 Switch Processor.
1 FSIP controller (4 Serial).
4 Serial network interfaces.
128K bytes of non-volatile configuration memory.
4096K bytes of flash memory on embedded flash (in RP1).
Configuration register is 0x2
```

Step 4 When the reinitialization is complete, verify that the Enabled LED on each FSIP lights and remains lit. If it does, proceed to step 7. If it does not, proceed to the next step.

Step 5 If the Enabled LED on an FSIP fails to light, suspect that the FSIP 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 FSIP faceplate. Tighten the captive installation screws. After the system reinitializes the interfaces, the Enabled LED on the FSIP should light. If it does, proceed to step 7. If it does not, proceed to the next step.

Step 6 If the Enabled LED still fails to light, remove the FSIP and try installing it in another available IP slot.

- If the Enabled LED lights when the FSIP is installed in the new slot, suspect a failed backplane port in the original IP slot.
- If the Enabled LED still fails to light, but other LEDs on the FSIP light to indicate activity, proceed to step 7 to resume the installation checkout and suspect that the Enabled LED on the FSIP has failed.
- If no LEDs on the FSIP light, suspect that the FSIP is faulty.
- If the Enabled LED still does not light, do not proceed with the installation. Contact a customer service representative to report the problem and obtain further instructions. (Instructions for obtaining technical assistance are provided at the end of this document.)

Step 7 Proceed to "Configuring the Interfaces" to reconfigure the interfaces for the new slot and port locations. If you replaced a four-port FSIP with an eight-port FSIP, the system will recognize the first four interfaces but will not recognize the four new additional interfaces. The four new interfaces will remain in the down state until you configure them.

If an error message is displayed on the console terminal, refer to the *Cisco 7000 Addendum to Router Products Configuration and Reference* publication for error message definitions. If you experience other problems that you are unable to solve, contact a customer service representative for assistance.

This completes the FSIP installation. If you installed a new FSIP or if you replaced a four-port FSIP with an eight-port FSIP, you must now configure the new interfaces as described in the following section.

Configuring the Interfaces

If you replaced a four-port SIP with an eight-port FSIP, or if you want to change the configuration of an existing interface, you must enter the configuration mode. If you installed new FSIP ports in exactly the same slot/port locations as the SIPs you removed (so the slot/port addresses of the serial interfaces did not change from their SIP addresses), you do not need to reconfigure the interfaces. The FSIP should recognize the existing configuration and bring up each serial interface. Otherwise, you will need to reassign new slot/port addresses to some of the interfaces. For a complete description of the Cisco 7000 slot/port numbering scheme and instructions for configuring new interfaces, refer to the accompanying document, *Fast Serial Interface Processor (FSIP) Installation and Configuration*, (Document Number 78-1147-02).

After you verify that all new FSIPs are installed correctly (the Enabled LED on each goes on and stays on), use the privileged-level **configure** command to configure new slot and port addresses for the new interfaces. Press the Return key after each configuration step unless otherwise noted.

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

```
Router# configure terminal
```

Step 2 At the prompt, specify the first interface to configure by entering the subcommand **interface**, followed by the *type* (**serial**) *and slot/port* (IP slot number/0). The example that follows is for the top port on an FSIP in IP slot 1:

```
interface serial 1/0
```

Step 3 Enter the IP address and subnet mask to the interface with the **ip address** configuration subcommand as in the following example:

```
ip address 145.22.4.67 255.255.255.0
```

Step 4 Add any additional configuration subcommands required to enable routing protocols and adjust the interface characteristics.

Step 5 If you are configuring a DTE interface, proceed to step 7. If you are configuring a DCE interface, you also need to configure the external clock signal as described in the next step.

Step 6 Set the clock rate with the **clockrate** command. (Refer to *Fast Serial Interface Processor Installation and Configuration Instructions* (Document Number 78-1147-02).)

```
clockrate 72000
```

Step 7 Change the shutdown state to up and enable the interface as follows:

```
no shutdown
```

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

Step 9 Write the new configuration to memory as follows:

```
Router# write memory
```

The system will display an OK message when the configuration has been stored.

Step 10 Proceed to the following section to check the interface configuration with **show** commands.

Checking the Configuration

After making all necessary configuration changes, observe the LED states and use the **show** commands to verify that each interface is up and operational. In addition to observing LEDs and show commands, you can also verify the interface states and network connections with the **ping** and **loopback** commands. For instructions and examples of these commands, refer to "Using the Ping and Loopback Commands" on page 34 of the accompanying document, *Fast Serial Interface Processor Installation and Configuration Instructions* (Document Number 78-1147-02).

Verifying FSIP LED States

The four LEDs indicate the state of the interface on the adjacent port. The labels on each LED indicate the signal state when the FSIP port is in DTE mode. When the FSIP port is in DCE mode, the direction of the signals is reversed. For example, a DCE device usually generates a clock signal, which it sends to the DTE device. Therefore, when the Receive Clock (RxC) LED on a DTE interface is on, it indicates that the DTE is receiving the clock signal from the DCE device. However, when the RxC LED on a DCE interface is on, it indicates that the DCE is sending a clock signal to the DTE device. Figure 7 shows the signal flow between a DTE and DCE device and the LEDs that correspond to signals for each mode.

Because of limited space on the FSIP faceplate, only DTE mode states are labeled on each port. Table 4 shows the LED states for ports in DTE and DCE mode.

Figure 6 FSIP LEDs

Figure 7 DTE to DCE Signals

Table 4 FSIP LEDs

LED	DTE Signal	DCE Signal
RxC	Receive clock (from DCE)	(TxC) Transmit clock (to DTE)
RxD	Receive data (from DCE)	(TxD) Transmit data (from DTE)
TxC	Send timing (from DCE)	(RxC) Receive timing (to DTE)
Conn	Connected	Connected

The Conn (connected) LED is on when the interface is connected to the network. During normal operation, the three other LEDs are on to indicate data and timing signal traffic, or an idle pattern that is commonly sent across the line during idle time.

The following LED state descriptions include the meanings for both DTE and DCE interfaces.

- RxC (receive clock)—On DTE interfaces, this LED is on when the port is receiving an external clock signal from the DCE. On DCE interfaces, this LED is on when the DCE is sending the RxC clock signal to the DTE.
- RxD (receive data)—On both DTE and DCE interfaces, this LED is on when the port is receiving data signals (packets) from the network. This LED is also on when it detects an idle pattern that is commonly sent across the network during idle time.
- TxC (transmit clock)—On DTE interfaces, this LED is on when the port is receiving the transmit clock signal. On DCE interfaces, it indicates that the DCE is sending the TxC signal to the DTE.
- Conn (connected or loopback)—On both DTE and DCE interfaces, this LED is on to indicate normal operation: the FSIP is properly connected to the external device, and TA (DTE available) and CA (DCE available) are active. When this LED is off, the FSIP is in loopback mode or is not connected to the network or external device.

Using Show Commands to Verify the FSIP Status

The following steps use **show** commands to verify that the new interfaces are configured and operating correctly. Refer to the FSIP configuration note, *Fast Serial Interface Processor Installation and Configuratio*n, Document No. 78-1147-02, for FSIP-specific command descriptions and examples, or to the appropriate software documentation.

Step 1 Display all of the current CxBus IPs and their interfaces with the **show controllers cxbus** command. Verify that all new interfaces are no longer shut down.

Step 2 Specify one of the new serial interfaces with the **show interfaces serial** *slot/port* command and verify that the first line of the display specifies the interface with the correct slot number. Also verify that the interface and line protocol are in the correct state: up or down.

Step 3 Display the protocols configured for the entire system and specific interfaces with the **show protocols** command. If necessary, return to the configuration mode to add or remove protocol routing on the system or specific interfaces.

Step 4 Display the entire system configuration file with the **show configuration** command. Verify that the configuration is accurate for the system and each interface.

If the interface is down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the network interface is properly connected and terminated. If you still have problems bringing the interface up, contact a service representative for assistance.

This completes the configuration procedure for the new FSIP interfaces.

Returning SIPs to the Factory

After you install the new FSIPs, you must return the SIPs (and any spares for which you received replacements) within 30 days from the upgrade kit shipment date or you will be invoiced for any outstanding equipment. For each four-port FSIP you receive, you should return one SIP. For each eight-port FSIP you receive, you should return two SIPs. Return the SIPs with all four port adapters in place, and with the SIP serial cables if you received them from Cisco. Also, return all spare SIP port adapters for which you received FSIP port adapter replacements. Cable spares are not included in the no-cost upgrade, so you do not have to return any spare SIP cables.

The SIPs you replaced should already be stored in the shipping containers from the replacement FSIPs. Follow the enclosed shipping instructions to return the equipment to Cisco Systems:

Step 1 Check the inventory of the shipping containers and ensure that you have all equipment that should be returned:

- For each four-port FSIP you received, you should return one SIP (and four SIP interface cables if you received the cables from Cisco).
- For each eight-port FSIP you received, you should return two SIPs (and eight SIP interface cables if you received the cables from Cisco).
- For each FSIP port adapter spare you received, you should return two SIP port adapter spares. (Each FSIP universal dual port adapter replaces the equivalent of two single SIP port adapters.)

Step 2 Ensure that the RMA number is written on all return labels, and is included in the sender's reference box on the air waybill (see the sample included with the shipping instructions):

- On the DHL form, the RMA number should be in the upper left Shipper's Reference box.
- On the Federal Express form, the RMA number should be on the left in box #2.

Step 3 Enter the appropriate account number in the Sender's/Shipper's Account No. box (the upper left box on both DHL and Federal Express forms). Account numbers are as follows:

- Domestic (shipped within U.S.): Use FedEx 2-day service. Cisco's billing number, which should be preprinted on the waybill in box #7, is: **1249-1354-3**
- International (shipped from outside U.S.): Prepare an Export Pro-Forma/Customs invoice, which must accompany the replacement parts being returned (refer to the samples included with the shipping instructions for guidance). Then refer to Table 5 for the courier and Cisco billing account number to use for your country. If DHL is the indicated courier, enter the appropriate Cisco billing number in the Shipper's Account No. box on the DHL waybill. If Federal Express is the indicated courier, you do not need to write in a billing number— it is already preprinted on the waybill.

  Note: If the preprinted airbill is not suitable for your country, please use your country's version of the appropriate air waybill.

Step 4 Place a one of the enclosed preprinted shipping labels on each container, and ensure that the RMA number for your shipment is visible on each one to ensure that you are credited for the returned equipment. If you need additional labels, please create your own and ensure that each one includes the RMA number and the following address:

Cisco Systems, Inc.
3535 Garrett Drive
Santa Clara, CA 95054
Attention: FSIP Project

Step 5 Deliver all packaged equipment to your company's shipping department for return to Cisco Systems.

If you have any questions regarding this order, please call:

800-553-6387 (Domestic), 415-903-7208 (Int'l)
Fax 415-903-8700 (Domestic and Int'l)
If you have any questions regarding the return of this order, please call:
Jim Mutnick, Cisco Systems Logistics 415-903-8781
Cisco Logistics Fax 415-903-7550

Table 5 Billing Account Numbers for International Shipments

Country	Account No.	Courier
Austria	950603300	DHL
Australia	2009992	DHL
Belgium	950603300	DHL
Canada	1249-1354-3[1]	Federal Express
Denmark	950603300	DHL
France	950603300	DHL
Germany	950603300	DHL
Hong Kong	D1505021	DHL
Indonesia	JKT0159	DHL
Israel	1249-1354-3[1]	Federal Express
Italy	950603300	DHL
Luxembourg	950603300	DHL
Netherlands	950603300	DHL
Norway	950603300	DHL
South Africa	950603300	DHL
Sweden	950603300	DHL
Switzerland	950603300	DHL
United Kingdom	950603300	DHL

1. The billing number is preprinted on Federal Express waybills

Reference Information and Assistance

This section provides lists of related documents that are referenced in this document, and information for obtaining technical assistance if necessary.

Related Publications

Table 6 lists the related publications that are referenced in this document. Contact a customer service representative for ordering information.

Table 6 Related Documents

Part No.	Title
83-0096-01	*Cisco 7000 Hardware Installation and Maintenance* (DOC-7000IM2)
83-0039-01	*Router Products Configuration and Reference, Software Release 9.1* (Order No. DOC-R9.1)
78-1195-02	*Router Products Configuration and Reference Addendum*
78-1144-05	*Upgrading Software and Microcode in Cisco 7000 Series Routers*
78-1112-07	*Router Products Release Notes for Software Release 9.17(5)*
78-1147-02	*Fast Serial Interface Processor (FSIP) Installation and Configuration*

Note For technical assistance, contact a service representative or the Cisco Systems Technical Assistance Center (TAC) at 800 553-2447, 415 903-7209, or `tac@cisco.com`. For upgrade or product information, contact the Customer Response Center at 800 553-6387, 415 903-7208, or `cs-rep@cisco.com`.

Customer Information Online

Cisco Systems' Customer Information Online (CIO) system provides online information and electronic services to Cisco direct customers and business partners. Basic CIO services include general Cisco information, product announcements, descriptions of service offerings, and download access to public and authorized files, including release notes, and software. Maintenance customers receive a much broader offering, including technical notes, the bug database, and electronic mail access to the TAC. (Maintenance customers must have authorization from their Cisco contract administrators to receive these privileges.)

For dialup or Internet users, CIO supports Zmodem, Kermit, Xmodem, FTP PUT, Internet e-mail, Telnet, rlogin, and fax download options. Internet users also can retrieve files from CIO using FTP.

Registration for CIO is handled on line. To reach CIO via the Internet, use Telnet or FTP to `cio.cisco.com` (131.108.89.33). To reach CIO by dialup, use 415 903-8070 (Mountain View, California) or 33 1 6446 4082 (Paris, France).

This document is to be used in conjunction with the *Cisco 7000 Hardware Installation and Maintenance* and *Cisco 7010 Hardware Installation and Maintenance* publications.