Doc. No. 78-2658-02

Versatile Interface Processor (VIP2) Installation, Configuration, and Maintenance

Product Numbers: VIP2-10(=), VIP2-20(=), and VIP2-40(=)

This configuration note is a standalone publication that provides instructions for installing, configuring, and maintaining the second-generation Versatile Interface Processor (VIP2) in all Cisco 7500 series routers, and in Cisco 7000 series routers using the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI). See the section "Software and Hardware Prerequisites," on page 11, for specific compatibility requirements.

Note Use this configuration note in conjunction with the port adapter configuration notes appropriate to your VIP2 hardware configuration. Additional port adapter configuration notes accompany each VIP2-compatible port adapter you ordered with your VIP2 or chassis, or as spares, and discuss port adapter-specific configuration requirements. Depending on your VIP2/port adapter configuration, refer to the appropriate port adapter configuration note.

Included in this configuration note are steps for VIP2 hardware installation, and basic VIP2 configuration steps and examples. Also included are maintenance procedures for upgrading user-configurable VIP2 components. A table of contents is included so you can more easily find what you need.

For complete descriptions of interface subcommands and the configuration options available for VIP2-related interfaces, and which support VIP2 functionality, refer to the appropriate Cisco Internetwork Operating System (Cisco IOS) configuration publications listed in the section "If You Need More Information" on page 3.

Document Contents

This configuration note includes the following sections:

Note The following section contains important information regarding software and hardware requirements.

Caution To prevent system problems, do not remove port adapters from the VIP2 motherboard, or attempt to install other port adapters on the VIP2 motherboard, *while the system is operating*. To install or replace port adapters, first remove the VIP2 from its interface processor slot.

If You Need More Information

The Cisco Internetwork Operating System (Cisco IOS) software running your router contains extensive features and functionality. The effective use of many of many of these features is easier if you have more information at hand. For additional information on configuring and maintaining the Cisco 7000 family routers and VIP2, the following documentation resources are available to you:

- Cisco Connection Documentation, Enterprise Series CD-ROM

  This publication and additional Cisco Systems publications are available on a CD-ROM called Cisco Connection Documentation, Enterprise Series, which is Cisco's online library of product information. The CD-ROM is updated and shipped monthly, so it might be more up to date than printed documentation. To order Cisco Connection Documentation, Enterprise Series CD-ROM, contact a Cisco Sales or Customer Service representative.

- For systems with Cisco IOS Release 11.1(472), a Cisco-approved Release 11.1(472) beta software version, or a later Cisco IOS maintenance release, refer to the following modular configuration and modular command reference publications, as appropriate for your configuration:

  — *Configuration Fundamentals Configuration Guide*

  — *Configuration Fundamentals Command Reference*

  — *Wide-Area Networking Configuration Guide*

  — *Wide-Area Networking Command Reference*

  — *Network Protocols Configuration Guide*

  — *Network Protocols Command Reference*

  — *Bridging and IBM Networking Configuration Guide*

  — *Bridging and IBM Networking Command Reference*

  — *Configuration Builder Getting Started Guide*

  — *Troubleshooting Internetworking Systems*

- For hardware installation and maintenance information on the Cisco 7000 family routers, refer to the following publications:

  — *Cisco 7000 Hardware Installation and Maintenance*

  — *Cisco 7010 Hardware Installation and Maintenance*

  — *Cisco 7505 Hardware Installation and Maintenance*

  — *Cisco 7507 Hardware Installation and Maintenance*

  — *Cisco 7513 Hardware Installation and Maintenance*

- To view Cisco documentation or obtain general information about documentation, refer to the Cisco Connection Documentation, Enterprise Series CD-ROM, to the section "Cisco Connection Online," on page 41, or call 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`. You can also refer to the *Cisco Information Packet* that shipped with your router.

What Is the Cisco 7000 Series?

The Cisco 7000 series consists of the Cisco 7000 and Cisco 7010 routers. The VIP2 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 software and hardware requirements, refer to the section “Software and Hardware Prerequisites” on page 11.

Network interfaces reside on modular interface processors, including the VIP2, which are inserted into interface processor slots and provide a direct connection between external networks and the high-speed CxBus in the Cisco 7000 series. The Cisco 7000 series supports any combination of available VIP2 port adapter-based network interface types.

In the Cisco 7000, slot 5 is reserved for the RSP7000 (7000 RSP slot shown in Figure 1), which contains the system processor and performs packet switching functions, and slot 6 is reserved for the RSP7000CI (7000 CI slot shown in Figure 1), which contains all of the environmental monitoring functions for the Cisco 7000. The remaining five slots (slots 0 through 4) are for interface processors and any combination of VIP2 network interface types.

Figure 1 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 2), which contains the system processor and performs packet switching functions, and slot 4 is reserved for the RSP7000CI (7000 CI slot shown in Figure 2), which contains all of the environmental monitoring functions for the Cisco 7010. The remaining three slots (slots 0 through 2) are for interface processors and any combination of VIP2 network interface types.

Figure 2 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 VIP2 will operate in the Cisco 7500 series routers. For software and hardware requirements, refer to the section “Software and Hardware Prerequisites” on page 11.

Network interfaces reside on modular interface processors, including the VIP2, which are inserted into interface processor slots and provide a direct connection between external networks and the high-speed CyBus in the Cisco 7500 series. The Cisco 7000 series supports any combination of available VIP2 port adapter-based network interface types.

Figure 3, Figure 4, and Figure 5 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 3), 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 and any combination of VIP2 network interface types.

Figure 3 Cisco 7505, Interface Processor End

Figure 4 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 and any combination of VIP2 network interface types.

Figure 4 Cisco 7507, Interface Processor End

Figure 5 shows the rear of the Cisco 7513 with two AC-input power supplies installed. Two slots (6 and 7) are reserved for the second generation Route Switch Processor (RSP2), which contains the system processor and performs packet switching functions. Slots 0 through 5 and 8 through 12 are for interface processors and any combination of VIP2 network interface types.

Figure 5 Cisco 7513, Interface Processor End

Versatile Interface Processor Functions

The following sections describe the VIP2 and discuss VIP2-specific features and functions, such as installing and removing the VIP2, installing and removing port adapters, upgrading dynamic random access memory (DRAM) and static random-access memory (SRAM), and using and configuring common VIP2 interface functions.

What is the VIP2?

The VIP2 is the second generation of the new interface processor for use with the Cisco 7000 series routers, using the RSP7000, and Cisco 7500 series routers. The VIP2 installs in the interface processor slots in your 7000 family router.

Caution The VIP2 supports online insertion and removal (OIR), which allows you to remove and replace a VIP2 without first shutting down the system. Online insertion and removal maximizes router availability by letting you add or remove VIP2s during system operation; however, the system may indicate a hardware failure if you fail to follow proper procedures. Further, and to prevent system problems, do not remove port adapters from the VIP2 motherboard or attempt to install other port adapters on the VIP2 motherboard, *while the system is operating*. To install or replace port adapters, first remove the VIP2 from its chassis slot.

The VIP2 uses a single motherboard with up to two port adapters. The VIP2 port adapters provide the individual LAN, WAN, or LAN/WAN interface ports. The VIP2 can be removed from a chassis while power is on and the system is operating.

The current VIP2 products have the following DRAM and SRAM configurations:

- VIP2-10(=)—512 kilobytes (KB) of SRAM and 8 megabytes (MB) of DRAM
- VIP2-20(=)—1 MB of SRAM and 16 MB of DRAM
- VIP2-40(=)—2 MB of SRAM and 32 MB of DRAM

The VIP2's central processing unit (CPU) is a Reduced Instructions Set Computing (RISC), Mips 4700 processor, and has an internal operating frequency of 100 megahertz (MHz) and a 50-MHz system bus interface. The VIP2 has 128 KB of nonvolatile random-access memory (NVRAM).

The VIP2-10 has 512 KB of static random-access memory (SRAM) and 8 megabytes (MB) of dynamic random access memory (DRAM) as the default memory configuration, and can support the following SRAM and DRAM memory-configuration upgrades:

- VIP2-10/20-UPG—1 MB of SRAM and 16-MB of DRAM
- VIP2-10/40-UPG and VIP2-20/40-UPG—2 MB of SRAM and 32-MB of DRAM

Note For additional DRAM and SRAM upgrade information, refer to the configuration note *Upgrading DRAM and SRAM on the Second-Generation Versatile Interface Processor (VIP2)* (Text Part Number 78-3323-xx, Customer Order Number DOC-VIP2UPG), which ships with the DRAM/SRAM upgrade kits, and is available on the Cisco Connection Documentation, Enterprise Series CD-ROM. Also refer to the section "Software and Hardware Prerequisites" on page 11 for additional DRAm and SRAM prerequisites.

Figure 6 shows a VIP2 with installed port adapters. The VIP2 card and port adapters have handles that allow for easy installation and removal. The VIP2 firmware (microcode), which contains card-specific software instructions, resides in a programmable read-only memory (PROM) device. Single in-line memory modules (SIMMs) contain the DRAM (U1 and U2) and a dual in-line memory module (DIMM) contains the SRAM (U5). You can install VIP2s in any available interface processor slots in your Cisco 7000 family router.

Note You cannot use DRAM designated for the RSP1, RSP2, or RSP7000 on the VIP2.

Figure 6 VIP2 with Two Port Adapters (Horizontal Orientation Shown)

Note In the Cisco 7000, Cisco 7507, and Cisco 7513 chassis the VIP2 is installed vertically. In the Cisco 7010 and Cisco 7505 chassis, the VIP2 is installed horizontally. For port adapter interface pinouts, refer to the appropriate pinout sections in the port adapter configuration notes, which accompanied your port adapters.

Port Adapter Hardware Overview

The port adapters attach to the VIP2 motherboard. (See Figure 6.) Each port adapter contains the physical connections for the VIP2 interface types to connect to your network. Following are the electrical interfaces supported by the VIP2 port adapters:

- IEEE 802.3 Ethernet 10BASE-T
- IEEE 802.3 Ethernet 10BASE-FL
- IEEE 802.3u Fast Ethernet 100BASE-TX and 100BASE-FX
- Synchronous serial (EIA/TIA-232, EIA/TIA-449, EIA-530, V.35, and X.21)
- IEEE 802.5 Token Ring
- Fiber Distributed Data Interface, multimode and single-mode

Caution VIP2s with a single port adapter *must* have a blank port adapter installed to maintain compliance with electromagnetic interference (EMI) emissions standards and chassis airflow requirements. Each port adapter has one Phillips-head screw that secures it to its port adapter slot.

Figure 7 VIP2 with One FE-TX Port Adapter and a Blank Port Adapter Installed

Note To ensure proper airflow in the chassis and compliance with EMI prevention standards,VIP2s with a single port adapter must have a blank port adapter installed in the empty port adapter slot location, as shown in Figure 7.

Software and Hardware Prerequisites

The VIP2 operates with the CyBus in the Cisco 7500 series and, depending on your VIP2 port adapter configuration and protocol requirements, requires that the host routers are running Cisco IOS Release 11.1(472) or later.

The VIP2 operates with the CxBus in the Cisco 7000 series routers providing these routers have the RSP7000 and RSP7000CI installed, and depending on your VIP2 port adapter configuration and protocol requirements, that the host routers are running Cisco IOS Release 11.1(472) or later. For proper operation with the VIP2, we recommend that your RSP or RSP7000 has at least 24 MB of DRAM.

Note To boot a Cisco IOS image over the network, after you install a new VIP2, you must upgrade the boot-loader image rsp-boot-m, which is installed in Flash memory on your RSP, to version rsp-boot-m.111-472, or later. Instructions for downloading this boot-loader image are available on CCO with the boot-loader image, in the /111-472/ directory. After the new boot-loader image is installed in Flash memory, issue the **reload** command to boot the appropriate Cisco IOS release RSP/VIP subset image for your system. Refer to Table 1 for the specific RSP/VIP subset image names that are available on CCO in the /111-472/ directory. Refer to the section "Cisco Connection Online," on page 41, for information on accessing CCO.

Table 1 RSP/VIP Cisco IOS Release Subsets

Cisco IOS Subset Images	Description
rsp-ajv-mz.111-472	Enterprise plus APPN
rsp-jv-mz.111-472	Enterprise
rsp-pv-mz.111-472	Internet Service Provider

Note The maximum transmission unit (MTU) sizes available for two 4R, 4T, and FDDI port adapters on a VIP2 might require additional VIP2 SRAM to ensure adequate buffers. We recommend the VIP2-20 for use with these port adapters. The minimum recommended VIP2 model is a VIP2-10, *if* you only have one 4T or one FDDI port adapter on a VIP2. Also, the Distributed Switching (DSW) and Distributed Services (DS) features might require additional VIP2 DRAM and SRAM. Refer to Table 2.

Table 2 VIP2 Model Minimum Recommendations for Using DSW and DS

VIP2 Models	Recommended for DSW	Recommended for DS
VIP2--10: 512 KB of SRAM and 8 MB of DRAM	No	No
VIP2-20: 1 MB of SRAM and 16 MB of DRAM	Yes	No
VIP2--40: 2 MB of SRAM and 32 MB of DRAM	Yes	Yes

Note When DSW is enabled on a VIP2-20, the routing table generated by the RSP or RSP7000 is downloaded to the VIP2 DRAM. Depending on the size of the routing table it may become necessary to upgrade to the VIP2-40. Table 3 provides a general guideline based on the number of network nodes and recommends which VIP2 model should be used.

Table 3 Recommended VIP2 Models Based on Network Size

Number of network nodes	Less than 40,000	Greater than 40,000
VIP2[1] model to use	VIP2-20	VIP2-40

1. Recommended.

Caution The VIP2 supports online insertion and removal (OIR), which allows you to remove and replace a VIP2 without first shutting down the system. Online insertion and removal maximizes router availability by letting you add or remove VIP2s during system operation; however, the system may indicate a hardware failure if you fail to follow proper procedures. Further, and to prevent system problems, do not remove port adapters from the VIP2 motherboard or attempt to install other port adapters on the VIP2 motherboard, *while the system is operating*. To install or replace port adapters, first remove the VIP2 from its chassis slot.

Microcode Overview

The VIP2 microcode (firmware) is an image that provides card-specific software instructions. A programmable read-only memory (PROM) device on the VIP2 contains a default microcode boot image that assists the system in finding and loading the microcode image from the Cisco IOS bundle or Flash memory. The router supports downloadable microcode, which enables you to upgrade microcode versions by downloading new microcode images, storing them in system Flash memory, and instructing the system to load its image from Flash. You can store multiple images for an interface type and, with a configuration command, instruct the system to load any one of them or the default microcode image. The microcode boot image in the PROM initializes the VIP2 and then assists downloading the VIP2 microcode image. All interfaces of the same type (VIP2, and so on) will load the same microcode image, either from the microcode image bundled with the Cisco IOS or from an image stored in system Flash. Although multiple microcode versions for a specific interface type can be stored concurrently in Flash, only one image can load at startup.

The **show controllers cbus** command displays the currently loaded and running microcode version for each interface processor, and VIP2. The **show startup-config** EXEC command shows the current system instructions for loading microcode at startup.

Software and interface processor microcode images are carefully optimized and bundled to work together. Overriding the bundle can result in system incompatibilities. We recommend that you use the microcode included in the software bundle. For a complete description of microcode and downloading procedures, refer to the section “Upgrading VIP2 Microcode” on page 27.

Installation Prerequisites

This section provides a list of parts and tools you will need to perform the installation, and it also includes safety and ESD-prevention guidelines to help you avoid injury and damage to the equipment. This section also provides a detailed description of the OIR function to help you perform online installation successfully and avoid error message and system restarts.

Note If you are installing a new VIP2, and preparing your site and planning network connections, be sure to review the equipment descriptions and interface cable distance limitations in the appropriate section in the port adapter configuration notes, which accompanied your port adapters.

List of Parts and Tools

You need the following tools and parts to install or upgrade a VIP2. If you need additional equipment, contact a service representative for ordering information.

- Cables appropriate for the port adapter interfaces on your VIP2
- Number 1 Phillips and a 3/16-inch, flat-blade screwdriver
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, FRUs, and spares

Safety Guidelines

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring.

Electrical Equipment Guidelines

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 Guidelines

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. Port adapters and processor modules comprise printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

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 an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

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

Online Insertion and Removal—An Overview

The OIR feature allows you to remove and replace a VIP2 board while the system is operating; you do not need to notify the software or shut down the system power.

Caution To prevent system problems, do not remove port adapters from the VIP2 motherboard or attempt to install other port adapters on the VIP2 motherboard, *while the system is operating*. To install or replace port adapters, first remove the VIP2 from its chassis slot.

This section describes mechanical functions of system components, emphasizes the importance of following correct procedures to avoid unnecessary board failures, and is for background only; specific VIP2 procedures follow in the section "VIP2 Installation" on page 19.

Each interface processor contains a receptacle with which it connects to the system backplane. Each backplane connector comprises a set of tiered pins, in three lengths. The pins send specific signals to the system as they make or break contact with the card.

The system assesses the signals it receives and the order in which it receives them to determine what event is occurring and what task it needs to perform, such as reinitializing new interfaces or shutting down removed ones.

For example, when inserting an interface processor, the longest pins make contact with the backplane first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them. The system expects to receive signals from the individual pins in this logical sequence, and the ejector levers help to ensure that the pins mate in this sequence.

When you remove or insert an interface processor, the backplane pins send signals to notify the system, which then performs as follows:

1. Rapidly scans the backplane for configuration changes and does not reset any interfaces.
2. Initializes all newly inserted interface processors, noting any removed interfaces and placing them in the administratively shut down state.
3. Brings all previously configured interfaces on the interface processor back to the state they were in when they were removed. Any newly inserted interfaces are put in the administratively shut down state, as if they were present (but unconfigured) at boot time. If a similar interface processor type has been reinserted into a slot, then its ports are configured and brought on line up to the port count of the original interface processor.

The system brings on line only interfaces that match the current configuration and were previously configured as up; all others require that you configure them with the **configure** command. OIR functionality enables you to add, remove, or replace interface processors with the system online, which provides a method that is seamless to end users on the network, maintains all routing information, and ensures session preservation.

The function of the ejector levers (see Figure 8) is to align and seat the card connectors in the backplane. Failure to use the ejector levers and insert the interface processor properly can disrupt the order in which the pins make contact with the card or interface processor. Follow the VIP2 installation and removal instructions carefully, and review the following examples of *incorrect* insertion practices and their results:

- Using the handle to force the interface processor all the way into the slot can pop the ejector levers out of their springs. If you then try to use the ejector levers to seat the interface processor, the first layer of pins (which are already mated to the card or interface processor) 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 damage the pins on the board connectors if they are not aligned properly with the backplane.
- When using the handle (rather than the ejector levers) to seat the interface processor in the backplane, you might need to pull the interface processor back out and push it in again to align it properly. Even if the backplane pins are not damaged, the pins mating with and disconnecting from the card or interface processor will cause the system to interpret a board failure. Using the ejector levers ensures that the board connector mates with the backplane in one continuous movement.
- Using the handle to insert or remove an interface processor, or failing to push the ejector levers fully against the interface processor, can leave some (not all) of the connector pins mated to the card or interface processor, a state which will hang the system. Using the ejector levers 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 an interface processor to ensure that the backplane connector pins disconnect from the interface processor in the sequence expected by the system. Any interface processor that is only partially connected to the backplane can hang the bus. Steps for correctly performing OIR are included with the following procedures for installing and removing the VIP2.

Figure 8 Ejector Levers and Captive Installation Screws on the VIP2 (Horizontal Orientation Shown)

Note The VIP2 is oriented horizontally in the Cisco 7010 and Cisco 7505 and vertically in the Cisco 7000, Cisco 7507, and Cisco 7513.

VIP2 Installation

The following sections describe the procedures for removing or installing a VIP2 in the Cisco 7000 family routers. The functionality is the same for each router model; therefore, the term *the chassis* will be used except where specific model issues arise. The OIR function allows you to install and remove a VIP2 without first shutting down the system; however, you must follow the instructions carefully. Failure to insert the VIP2 properly can cause system error messages indicating a board failure. For a complete description of OIR, refer to the section "Online Insertion and Removal—An Overview" on page 16.

Each unused interface processor slot contains an interface processor filler (which is an interface processor carrier without an interface board) to keep dust out of the chassis and to maintain proper air flow through the interface processor compartment. If you are installing a new VIP2 that is not a replacement, you must first remove the interface processor filler from an unused slot; proceed to the next section "Removing an Interface Processor or Interface Processor Filler." If you are replacing a VIP2, proceed to the section "Removing a VIP2."

Note For proper operation with the VIP2, we recommend that your RSP1, RSP2, or RSP7000 has at least 24 MB of DRAM.

Removing an Interface Processor or Interface Processor Filler

If you plan to replace a currently installed interface processor with a VIP2, attach an ESD-preventive wrist strap between you and any unpainted chassis surface; interface processor fillers do not require protection from ESD. Select an interface processor slot for the new VIP2 and remove the interface processor or interface processor filler as follows:

Step 1 Use a screwdriver to loosen the captive installation screws on the interface processor or interface processor filler. (See Figure 8.)

Step 2 Place your thumbs on both ejector levers and simultaneously pull them both outward to release the filler from the backplane connector (in the opposite direction from that shown in Figure 8c).

Step 3 Grasp the handle with one hand and pull the card straight out of the slot, keeping your other hand under the carrier to guide it. (See Figure 9.) Keep the carrier parallel to the backplane.

Step 4 Store the interface processor or interface processor filler for future use.

To help prevent dust and contaminants from entering the chassis, do not leave the interface processor slot open. Immediately proceed to the section "Installing a VIP2" on page 21.

Removing a VIP2

Remember, the VIP2 supports OIR; therefore, you need not shut down the interface or the system power when removing a VIP2 or interface processor. If you are replacing a failed VIP2, remove the existing board first, then install the new VIP2 in the same slot. If you are replacing a currently installed interface processor with a VIP2, remove the existing board first, then install the new VIP2 in the same slot.

Note While the VIP2 supports OIR, individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis, then replace port adapters as required. Refer to the section "Installing or Replacing a VIP2 Port Adapter" on page 36.

Figure 9 shows proper handling of an interface processor during installation.

Figure 9 Handling Processor Modules for Installation and Removal (Horizontal Orientation Shown)

To remove a VIP2 or interface processor, follow these steps:

Step 1 Attach an ESD-preventive wrist strap between you and any unpainted chassis surface.

Step 2 If you are replacing a failed VIP2, disconnect all cables from the VIP2 ports; however, if you are only moving a VIP2 to another slot, this step is not necessary.

Step 3 Use a screwdriver to loosen the captive installation screws at both ends of the board. (See Figure 8.)

Caution Always use the ejector levers to remove or install the VIP2. Failure to do so can cause erroneous system error messages indicating a board failure.

Step 4 Place your thumbs on the ejector levers and simultaneously pull both of the ejectors outward (in the opposite direction from that show in Figure 8c) to release the VIP2 from the backplane connector.

Step 5 Use the board's handle to carefully pull it straight out of the slot, keeping your other hand under the carrier to guide it. (See Figure 9.) Keep the board parallel to the backplane.

Step 6 Place the removed board on an antistatic mat or foam pad, or place it in an antistatic container if you plan to return it to the factory.

Step 7 If the interface processor slot is to remain empty, install a filler (MAS7K-BLANK) to keep dust out of the chassis and to maintain proper air flow inside the chassis. *Do not* leave the interface processor slot open. Immediately proceed to the section "Installing a VIP2."

Installing a VIP2

The VIP2 slides into the open interface processor slot and connects directly to the backplane. The interface processors are keyed to guide pins on the backplane, so the VIP2 can be installed only in an interface processor slot. Figure 8 shows the functional details of inserting an interface processor and using the ejector levers. Figure 9 shows proper handling of an interface processor during installation.

Caution Remove or insert only one interface processor at a time. Allow at least 15 seconds for the system to complete its discovery and initialization before removing or inserting another interface processor. Disrupting the sequence before the system has completed verification can cause the system to interpret hardware failures.

Follow these steps to install a VIP2:

Step 1 Ensure that a console terminal is connected to the console port (on the RSP or RSP7000) and that your console is turned ON.

Step 2 Hold the VIP2 handle with one hand and place your other hand under the carrier to support the VIP2 and guide it into the slot. (See Figure 9.) Avoid touching the card or any connector pins.

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

Note The processor modules are oriented horizontally in the Cisco 7010 and Cisco 7505 and vertically in the Cisco 7000, Cisco 7507, and the Cisco 7513.

Step 3 Place the back of the VIP2 in the slot and align the notch on the carrier with the groove in the slot. (See Figure 8.)

Step 4 While keeping the VIP2 parallel to the backplane, carefully slide it into the slot until the back of the faceplate makes contact with the ejector levers, then *stop*. (See Figure 8b.)

Caution 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, and shoving or slamming the interface processor into the slot can damage the backplane pins and board.

Step 5 Using your thumbs, simultaneously push both ejector levers inward until the VIP2 is pushed entirely into its slot. (See Figure 8c.)

Step 6 Tighten both of the captive installation screws.

Caution To ensure proper electromagnetic interference (EMI) isolation for the chassis, make certain to tighten the captive installation screws on each VIP2 immediately after you install it and *before* proceeding with the installation of each remaining VIP2.

Checking the Installation and Verifying VIP2 Status

You can use the **configure** command to configure a VIP2 interface. To use the **configure** command, enter the privileged level of the EXEC command interpreter with the **enable** command. The system will prompt you for a password if one has been set.

The system prompt for the privileged level ends with a pound sign (#) instead of an angle bracket (>). At the console terminal, enter the privileged level as follows:

Step 1 At the user-level EXEC prompt, enter the **enable** command. The EXEC prompts you for a privileged-level password, as follows:

```
Router> enable
Password:
```

Step 2 Enter the password (the password is case sensitive). For security purposes, the password is not displayed on your console.

Step 3 When you enter the correct password and press **Return**, the system displays the privileged-mode system prompt (#) as follows:

```
Router#
```

Checking the VIP2 Installation

After you install the VIP2 and connect cables (using connection procedures in the respective port adapter subsections), verify the installation by observing the LED states and the console display. When the system has reinitialized all interfaces, the enabled LED on the VIP2 and on all interface processors should go on. Port adapter LEDs should be on, depending on your connection. The console screen will also display a message as the system discovers each interface during its reinitialization.

When you remove and replace 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 Fast Ethernet-equipped VIP2 was removed from slot 2; the system then reinitialized the remaining interface processors and marked as *down* the Fast Ethernet interfaces on the VIP2 that was removed from slot 2. When the VIP2 is reinserted, the system automatically brings up the interfaces that were up when the VIP2 was removed.

Removal

```
Router#
%OIR-6-REMCARD: Card removed from slot 2, interfaces disabled
%LINK-5-CHANGED: Interface FastEthernet2/0/0, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet2/1/0, changed state to administratively down
```

Insertion

```
Router#
%OIR-6-INSCARD: Card inserted in slot 2, interfaces administratively shut down
%LINK-5-CHANGED: Interface FastEthernet2/0/0, changed state to up
%LINK-5-CHANGED: Interface FastEthernet2/1/0, changed state to up
```

Note When a new VIP2 is inserted or when a VIP2 is moved to a new slot, the system recognizes the new interfaces, but leaves them in the *shutdown* state until you configure them and change their state to *up* with the **configure** command.

The following example display shows the events logged by the system as a *new* VIP2 is inserted in slot 3. (Fast Ethernet interfaces are used in the following examples.)

```
Router#
%OIR-6-INSCARD: Card inserted in slot 3, interfaces administratively shut down
%LINK-5-CHANGED: Interface FastEthernet3/0/0, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet3/1/0, changed state to administratively down
```

Verify that the VIP2 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 VIP2 as follows:

- If you installed a new VIP2, the system should recognize all new interfaces but leave them configured as *down*.
- If you replaced a VIP2, the system should recognize each interface and place it in the same state (*up* or *down*) each was in when you removed the VIP2.

Step 2 When the reinitialization is complete, verify that the enabled LED on each port adapter goes on and remains on. If it does, proceed to step 5. If it does not, proceed to the next step.

Step 3 If the enabled LED on a port adapter fails to go on, suspect that the VIP2 board connector is not fully seated in the backplane. Loosen the captive installation screws, then firmly push both ejector levers into place until they are approximately in the same orientation as the VIP2 faceplate. Tighten the captive installation screws. After the system reinitializes the interfaces, the enabled LED on the port adapter should go on. If it does, proceed to step 5. If it does not, proceed to step 4.

Step 4 If the enabled LED still fails to go on, remove the VIP2 and try installing it in another available interface processor slot.

- If the enabled LED goes on when the VIP2 is installed in the new slot, suspect a failed backplane port in the original interface processor slot.
- If the enabled LED still fails to go on, but other LEDs on the VIP2 go on to indicate activity, proceed to step 5 to resume the installation checkout and suspect that the enabled LED on the port adapter has failed.
- If no LEDs on the VIP2 go on, suspect that the VIP2 is faulty. Contact a service representative to report the problem and obtain further instructions.

Step 5 If the VIP2 is new and not a replacement, you have to configure the new interfaces. Proceed to the appropriate configuration section for your port adapter. (This does not have to be done immediately, but new interfaces will not be available until you configure them.)

Step 6 If the VIP2 is a replacement, use the **show interfaces** *type slot/port adapter/port* or **show controllers cbus** command to verify the status of the interfaces. (Refer to the section “Verifying VIP2 Status Using show Commands” on page 24.)

If you replaced a VIP2 with a new VIP2 with a greater number of ports (for example, if you replaced a single-port adapter VIP2 with a dual-port adapter VIP2), the system will recognize the interfaces on the previously configured port adapter, but will not recognize the additional port adapter interfaces. The new interfaces will remain in the shutdown state until you configure them.

Step 7 When the interfaces are up, check the activity of each interface by observing the status LEDs, which are described in the appropriate LED section for your port adapter type.

Step 8 In general, if an interface’s LED fails to go on and a cable is connected to the port, check the cable connection and make certain it is properly seated in the connector.

If an error message is displayed on the console terminal, refer to the *System Error Messages* 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 VIP2 installation. If you installed a new VIP2 or if you installed a replacement VIP2 with an additional port, you must now configure the new interface as described in the following section and in the appropriate Cisco IOS configuration documentation listed in the section "If You Need More Information" on page 3, all of which is available on CCO and Cisco Connection Documentation, Enterprise Series.

Verifying VIP2 Status Using show Commands

The following procedure describes how to use the **show** commands to verify that the new interfaces are configured correctly:

Step 1 Use the **show version** or **show hardware** commands to display the system hardware configuration. Ensure that the list includes the all the currently installed interfaces.

Step 2 Display all of the current interface processors and their interfaces with the **show controllers cbus** command. Verify that the new VIP2 appears in the correct slot.

Step 3 Specify one of the new VIP2 interfaces with the **show interfaces** *type slot/port adapter/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 4 Display the protocols configured for the entire system and specific interfaces with the command **show protocols**. If necessary, return to the Configuration mode to add or remove protocol routing on the system or specific interfaces.

Step 5 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.

The **show controllers cbus** command displays the internal status of each interface processor, including the slot location, the card hardware version, and the currently-running microcode version. It also lists each interface (port) on each interface processor including the logical interface number, interface type, physical (slot/port adapter/port) address, and hardware (station address) of each interface. The following example shows a VIP2, with Fast Ethernet interfaces (port adapters), installed in interface processor slot 1:

```
Router# show controllers cbus

(display text omitted)

slot1: VIP2, hw 2.2, sw 200.47, ccb 5800FF40, cmdq 48000088, vps 8192
    software loaded from flash slot1:svip200-47.fasttq
    FLASH ROM version 255.255
    FastEthernet1/0/0, addr 0000.0ca6.3321 (bia 0000.0ca6.3321)
      gfreeq 48000148, lfreeq 48000188 (1536 bytes), throttled 0
      rxlo 4, rxhi 240, rxcurr 16, maxrxcurr 16
      txq 48000200, txacc 48000202 (value 0), txlimit 150
    FastEthernet1/1/0, addr 0000.0ca6.3329 (bia 0000.0ca6.3329)
      gfreeq 48000148, lfreeq 48000288 (1536 bytes), throttled 0
      rxlo 4, rxhi 240, rxcurr 16, maxrxcurr 16
      txq 48000208, txacc 4800020A (value 0), txlimit 150

(display text omitted)
```

To determine which type of port adapter is installed on a specific VIP2 in your system, use the **show diag** *slot* command. Specific port adapter information is displayed: chassis slot, VIP2 controller information (including hardware revision, serial number, part number, DRAM size, and so forth), and specific port adapter information (including port adapter slot [or *bay*], port adapter type, number of interfaces, hardware revision, serial number, and part number). Following is an example of the **show diag** *slot* command (with samples of several different port adapters included):

```
Router# show diag 1
Slot 1:
        Physical slot 1, ~physical slot 0xE, logical slot 1, CBus 0
        Microcode Status 0xC
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: Console I/O
        EEPROM format version 1
        VIP2 controller, HW rev 2.2, board revision UNKNOWN
        Serial number: 03508056  Part number: 73-1554-02
        Test history: 0x00        RMA number: 43-27-00
        Flags: cisco 7000 board; 7500 compatible

        EEPROM contents (hex):
          0x20: 01 15 02 02 00 35 87 58 49 06 12 02 00 2B 1B 00
          0x30: 12 2B 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

        Slot database information:
        Flags: 0x4      Insertion time: 0x10DC (00:01:17 ago)

        Controller Memory Size: 8 MBytes
```

(The following is what is displayed for a FE-FX port adapter in port adapter slot 0.)

```
        PA Bay 0 Information:
                Fast-Ethernet PA, 1 ports, 100BaseFX-ISL
                EEPROM format version 1
                HW rev 1.0, Board revision 43
             Serial number: 02826254  Part number: 73-1690-02
```

(The following is what is displayed for a 4T port adapter in port adapter slot 0.)

```
        PA Bay 0 Information:
                Fast-Serial PA, 4 ports
                EEPROM format version 1
                HW rev 1.0, Board revision 4
                Serial number: 02827523  Part number: 73-3417-04
```

(The following is what is displayed for a 4R port adapter in port adapter slot 0.)

```
        PA Bay 0 Information:
                Token Ring PA, 4 ports
                EEPROM format version 1
                HW rev 1.1, Board revision 0
                Serial number: 02827613  Part number: 73-1390-04
```

(The following is what is displayed for a 5EFL port adapter in port adapter slot 1.)

```
        PA Bay 1 Information:
                Ethernet PA, 5 ports
                EEPROM format version 1
                HW rev 1.0, Board revision 6
                Serial number: 03522225  Part number: 73-1679-01
```

(The following is what is displayed for PA-FDDI-SM in port adapter slot 0 and PA-FDDI-MM in port adapter slot 1.)

```
PA Bay 0 Information:
        FDDI PA, 1 ports
        EEPROM format version 1
        HW rev 1.0, Board revision 21
        Serial number: 03524551  Part number: 73-1630-01
```

(Where *Part number* in the last line refers to a PA-FDDI-SM port adapter.)

```
PA Bay 1 Information:
        FDDI PA, 1 ports
        EEPROM format version 1
        HW rev 1.0, Board revision 21
        Serial number: 02825768 Part number: 73-1558-01
```

(Where *Part number* in the last line refers to a PA-FDDI-MM.)

(The following is what is displayed for a 4E port adapter in port adapter slot 1.)

```
PA Bay 1 Information:
        Ethernet PA, 4 ports
        EEPROM format version 1
        HW rev 1.0, Board revision 160
        Serial number: 02023164  Part number: 73-1556-03
```

(The following is what is displayed for a 8E port adapter in port adapter slot 1.)

```
PA Bay 1 Information:
        Ethernet PA, 8 ports
        EEPROM format version 1
        HW rev 1.1, Board revision 80
        Serial number: 02825590  Part number: 73-1391-04
```

The **show startup-config** command displays the contents of the system configuration file stored in nonvolatile memory (NVRAM or Flash memory). This file should reflect all new configuration changes you made and wrote to memory with the **show running-config** command. (A Fast Ethernet interface is used in this example.)

```
Router# show startup-config

Using 1652 out of 130048 bytes
version 11.1(472)
!
hostname Router
!
enable-password hello
!
microcode VIP2 flash vip11-1
microcode reload
!
(display text omitted)
!
interface FastEthernet 3/0/0
ip address 1.1.1.1 255.255.255.248
interface FastEthernet 3/1/0
ip address 1.1.1.2 255.255.255.248
ip route-cache cbus
!
(display text omitted)
```

The **show protocols** command displays the global (system-wide) and interface-specific status of any configured Level 3 protocol.

```
Router# show protocols

Global values:
  Internet Protocol routing is enabled
FastEthernet3/1/0 is up, line protocol is up
```

VIP2 Maintenance Procedures

The following sections discuss maintenance procedures you might need for your VIP2 and port adapters:

- Upgrading VIP2 Microcode
- Upgrading VIP2 DRAM and SRAM, page 29
- Installing or Replacing a VIP2 Port Adapter, page 36

Upgrading VIP2 Microcode

The Cisco 7000 family routers support downloadable microcode, which enables you to upgrade microcode versions over the network. You can download new microcode versions and store multiple versions in Flash memory, and you can then boot from them just as you can with the system software images. System software upgrades may also contain upgraded microcode images, which will load automatically when the new software image is loaded (unless the configuration states otherwise).

Note Software and interface processor microcode images are carefully optimized and bundled to work together. Overriding the bundle can result in system incompatibilities. We recommend that you use the microcode included in the software bundle.

You can download microcode to Flash memory by copying the TFTP image of a microcode version to Flash memory. When the microcode image is stored in Flash memory you have to configure the router to use that image via the **microcode vip2 flash** command, then you can use the **microcode reload** command to manually load the new microcode file. You can then use the **configure** command to instruct the system to load the new image automatically at each system boot.

Note The appropriate microcode image runs from dynamic random-access memory (DRAM) on the VIP2.

To compare the size of the microcode image and the amount of Flash memory available, you must know the size of the new microcode image. The image size is specified in the README file that is included on the floppy disk with the new image.

Note Note the size of the new image before proceeding to ensure that you have sufficient available Flash memory for the new image.

Caution Before you copy a file to system Flash memory, be sure there is ample space available in Flash memory. Compare the size of the file you want to copy to the amount of available Flash memory shown. If the space available is less than the space required by the file you want to copy, the copy process will continue, but the entire file will not be copied into Flash memory.

Follow these steps to download (copy) a microcode version from a TFTP server to Flash memory.

Step 1 To display the total amount of Flash memory present, its location, any files that currently exist in Flash memory and their size, and the amount of Flash memory remaining, use the **show flash** command. Following is an example of the output that is displayed:

```
Router# show flash

-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. FFFFFFFF B4A18E0B 3F6494  30   4023316  Jun 26 1994 19:44:29 image/file/1
2   .. FFFFFFFF 8075AA5D 4118B4  23   111518   Jun 29 1994 11:05:57 image/file/2

12044568 bytes available (8533736 bytes used)
```

Step 2 Compare the amount of available Flash memory (last line in the preceding example) to the size of the new microcode image on the floppy disk. If you attempt to copy in a new image, and the size of the new image exceeds the available space in Flash, only part of the new image will be copied, and the following error message will be displayed:

```
buffer overflow - xxxx/xxxx
```

where *xxxx/xxxx* is the number of bytes read in/number of bytes available.

Step 3 After you verify that there is sufficient space available in Flash memory for the new image, use the command **copy tftp:***filename* [**flash** | **slot0** | **slot1**]:*filename* to copy an image to Flash memory. (**tftp:***filename* is the file's source and [**flash** | **slot0** | **slot1**]:*filename* is the destination in onboard Flash memory or on either of the Flash memory cards.)

An example of the **copy tftp:***filename* command follows:

```
Router# copy tftp:vip11-1 slot0:vip11-1
20575008 bytes available on device slot0, proceed? [confirm]
Address or name of remote host [1.1.1.1]?
Loading new.image from 1.1.1.1 (via Ethernet1/0): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!![OK - 7799951/15599616 bytes]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Router#
```

Step 4 Use the **show flash** command to verify that the microcode has been copied to Flash. The output should display the filename of the image you copied to Flash (*vip11-1* in the following example):

```
Router# show flash

-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. FFFFFFFF B4A18E0B 3F6494  30   4023316  Jun 26 1994 19:44:29 image/file/1
2   .. FFFFFFFF 8075AA5D 4118B4  23   111518   Jun 29 1994 11:05:57 image/file/2
3   .. FFFFFFFF EEA1FEEB 8436E8  22   600516     Oct 10 1995 19:35:25 vip11-1

7646052 bytes available (16179788 bytes used)
```

Step 5 To ensure that the new microcode is used when you reboot the system, add the appropriate commands to the configuration file. To modify the configuration file, enter the **configure terminal** command, as follows:

```
Router# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
```

Step 6 Specify that you are changing the microcode for the VIP2 (*microcode vip2*), and that it will load from Flash memory *(flash slot0* or *slot1)*. Then add the filename of the new microcode image to be loaded from Flash:

```
Router(config)# microcode vip2 flash slot0:vip11-1
```

Step 7 To exit Configuration mode, press **Ctrl-Z**.

Step 8 Copy the new configuration to nonvolatile random-access memory (NVRAM):

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

The **microcode reload** command is automatically added to your running configuration. The new VIP2 microcode image will load automatically the next time the system boots or reinitializes.

Step 9 To load the new microcode immediately, you can issue the **microcode reload** configuration command (you must be in Configuration mode to enter this command):

```
Router# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# microcode reload
```

Immediately after you enter the **microcode reload** command and press **Return**, the system reloads all microcode. Configuration mode remains enabled; after the reload is complete, press **Ctrl-Z** to exit from Configuration mode and return to the system prompt.

Step 10 To verify that the VIP2 is using the correct microcode, issue the **show startup-config** or **show controllers cbus** command, which indicates the currently loaded and running microcode version for each interface processor.

```
Router# show controllers cbus
```

This completes the procedure for downloading microcode to Flash memory.

Upgrading VIP2 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 VIP2, 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. The current VIP2 products have the following DRAM and SRAM configurations and available VIP2 upgrade products:

- VIP2-10—512 kilobytes (KB) of SRAM and 8 megabytes (MB) of DRAM
  - VIP2-10/20-UPG includes SRAM and DRAM required to upgrade VIP2-10 to VIP2-20
  - VIP2-10/40-UPG includes SRAM and DRAM required to upgrade VIP2-10 to VIP2-40
- VIP2-20—1 MB of SRAM and 16 MB of DRAM
  - VIP2-20/40-UPG includes SRAM and DRAM required to upgrade VIP2-20 to VIP2-40
- VIP2-40—2 MB of SRAM and 32 MB of DRAM (no upgrade is required or currently available)

The following sections describe upgrading DRAM and SRAM:

- Replacing VIP2 DRAM SIMMs, page 30
- Replacing the VIP2 SRAM DIMM, page 33

Replacing VIP2 DRAM SIMMs

The DRAM on the VIP2 is contained in two SIMMs located in sockets U1 and U2. (See Figure 10.) 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 VIP2.

Note Only DRAM from the Cisco Systems approved vendor list (AVL) should be used. 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 12 on page 32.) 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 a VIP2” on page 19.

Step 2 Place the VIP2 on an antistatic mat or pad and ensure that you are wearing an antistatic device, such as a wrist strap. Position the VIP2 so that the handle is away from you and the bus connector is toward you—opposite of the position shown in Figure 10.

Step 3 Locate the SIMMs. The DRAM SIMMs occupy sockets U1 and U2. (See Figure 10.)

Figure 10 Location of DRAM SIMMs on VIP2

Step 4 Release the spring clips from the SIMM that you want to remove and release the SIMM from the socket. (See Figure 11.)

Figure 11 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 12.)

Figure 12 Handling a SIMM

Caution To prevent ESD damage, handle SIMMs as shown in Figure 12.

Follow these steps to install the new SIMMs:

Step 1 With the VIP2 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 12.)

Step 5 Tilt the SIMM to approximately the same an 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 VIP2 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 SIMMs.

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 VIP2 SRAM DIMM.”

Replacing the VIP2 SRAM DIMM

The SRAM on the VIP2 is contained in a DIMM and located in socket U5. (See Figure 10 on page 30.) 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 VIP2.

Note Only SRAM from the Cisco Systems approved vendor list (AVL) should be used. 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 a VIP2” on page 19, if required.

Step 2 Place the VIP2 on an antistatic mat or pad, and ensure that you are wearing an antistatic device, such as a wrist strap. Position the VIP2 so that the handle is toward you, and the bus connector is facing away from you, approximately as shown in Figure 10.

Step 3 Locate the DIMM. The SRAM DIMM occupies socket U5. (See Figure 10.)

Step 4 Locate the release lever on the DIMM socket (see circle in Figure 13) and release the DIMM from the socket as shown.

Step 5 When one end of the DIMM is released from the socket (see Figure 13), 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 14.)

Figure 13 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 14.)

Figure 14 Handling an SRAM DIMM

Caution To prevent ESD damage, handle the DIMM as shown in Figure 14.

Follow these steps to install the new DIMM:

Step 1 With the VIP2 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 14.) Hold the sides of the DIMM between your thumb and middle 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 14.) 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 VIP2 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 15) and the DIMM's edge connector is fully inserted. If necessary, rock the DIMM gently back and forth to seat it properly.

Figure 15 Installing and 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 15.) 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.

Proceed to the section "Installing a VIP2" to replace the VIP2 in the chassis; then restart the system for an installation check. Refer to the section "Checking a DRAM and SRAM Upgrade."

Checking a DRAM and SRAM Upgrade

If, after a DRAM or SRAM upgrade or 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 VIP2. 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 VIP2 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 70 ns or faster. The speed is silkscreened along one edge of the SIMM.

Refer to the section "Checking the VIP2 Installation," on page 22, 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.

Installing or Replacing a VIP2 Port Adapter

Depending on the circumstances you might need to install a new port adapter on a VIP2 motherboard or replace a failed port adapter in the field. In either case, you need a number 1 Phillips screwdriver, an antistatic mat onto which you can place the removed interface processor, and an antistatic container into which you can place a failed port adapter for shipment back to the factory.

Note Each port adapter circuit board is mounted to a metal carrier and is sensitive to ESD damage. Each port adapter has one Phillips-head screw that secures it to its port adapter slot. We strongly recommend that the following procedures should be performed by a Cisco-certified service provider; however, this is not a requirement.

While the VIP2 supports online insertion and removal (OIR), individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis, then install or replace port adapters as required. If a blank port adapter is installed on the VIP2 in which you want to install a new port adapter, you must first remove the VIP2 from the chassis, then remove the blank port adapter.

Caution To prevent interface reconfiguration requirements, you *should* replace a port adapter with the same type of port adapter you removed, but this is not a requirement.

When only one port adapter is installed on a VIP2, a blank port adapter must fill the empty slot to allow the VIP2 and router chassis to conform to electromagnetic interference (EMI) emissions requirements, and so that air flows through the chassis properly. If you plan to install a new port adapter, you must first remove the blank port adapter.

Following is the standard procedure for removing and replacing any type of port adapter on the VIP2:

Step 1 Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

Note If you want to install a new port adapter on a VIP2 with a single port adapter, you must first remove the blank port adapter from the port adapter slot in which you want to install the new port adapter.

Step 2 For a new port adapter installation or a port adapter replacement, disconnect any interface cables from the ports on the front of the port adapter, although, this is not required. You can remove VIP2s with cables attached; however, we do not recommend it.

Step 3 To remove the VIP2 from the chassis, follow the steps in the section "Removing a VIP2."

Step 4 Place the removed VIP2 on an antistatic mat.

Step 5 Locate the screw at the rear of the port adapter (or blank port adapter) to be replaced. (See Figure 16.) This screw secures the port adapter (or blank port adapter) to its slot.

Figure 16 Location of Port Adapter Screw, Partial Port Adapter View

Step 6 Remove the screw that secures the port adapter (or blank port adapter).

Step 7 With the screw removed, grasp the handle on the front of the port adapter (or blank port adapter) and carefully pull it out of its slot, away from the edge connector at the rear of the slot. (See Figure 17.)

Figure 17 Pulling a Port Adapter Out of a Slot, Partial Port Adapter View

Step 8 If you removed a port adapter, place it in an antistatic container for safe storage or shipment back to the factory. If you removed a blank port adapter, no special handling is required; however, store the blank port adapter for potential future use.

Step 9 Remove the new port adapter from its antistatic container and position it at the opening of the slot. (See Figure 18.)

Caution To prevent jamming the carrier between the upper and lower edges of the port adapter slot, and to assure that the edge connector at the rear of the port adapter mates with the connector at the rear of the port adapter slot, make certain that the leading edges of the carrier are between the upper and lower slot edges, as shown in the cutaway in Figure 18.

Figure 18 Removing a Port Adapter

Step 10 Before you begin to insert the new port adapter in its slot, verify that the port adapter carrier should be between the upper and lower slot edges, as shown in Figure 19. Do not jam the carrier between the slot edges.

Caution To ensure a positive ground attachment between the port adapter carrier and the VIP2 motherboard and port adapter slot, and to ensure that the connectors at the rear of the port adapter and slot mate properly, the carrier must be between the upper and lower slot edges, as shown in Figure 19.

Step 11 Carefully slide the new port adapter into the port adapter slot until the connector on the port adapter is completely mated with the connector on the motherboard.

Figure 19 Aligning the Carrier Edge with Upper and Lower Slot Edges, Partial View

Step 12 Replace the screw in the rear of the port adapter slot. (See Figure 16 for its location.) Do not overtighten this screw.

Step 13 To replace the VIP2 in the chassis, follow the steps in the section “Installing a VIP2.”

Step 14 If disconnected, reconnect the interface cables to the interface processor.

This completes the procedure for installing a new port adapter or replacing a port adapter.

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