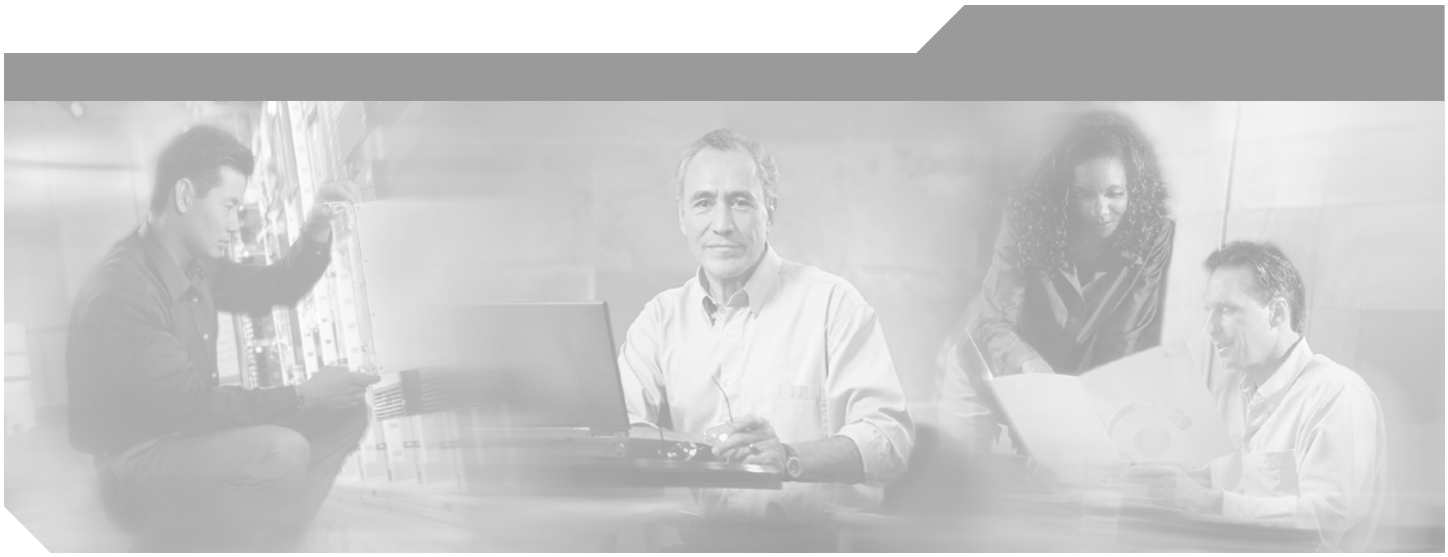

SA-Comp/1 and SA-Comp/4 Data Compression Service Adapter Installation and Configuration

Product Number: SA-Comp/1(=), SA-Comp/4(=)
Platforms Supported: Cisco 7200 Series, VIP2 in the Cisco 7000 Series and Cisco 7500 Series

Corporate Headquarters
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Text Part Number: OL-3574-02

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• Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

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Preface

This preface describes the objectives and organization of this document and explains how to find additional information on related products and services. This preface contains the following sections:

- Objectives, page v
- Organization, page v
- Related Documentation, page vi
- Obtaining Documentation, page vii
- Obtaining Technical Assistance, page viii

Objectives

This document describes how to install and configure the SA-Comp/1 and SA-Comp/4 service adapters, hereafter referred to as the CSA, which is used in the following platforms:

- Cisco 7200 series routers, consisting of the two-slot Cisco 7202, four-slot Cisco 7204, and the six-slot Cisco 7206
- VIP2 in Cisco 7000 series and Cisco 7500 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)

Organization

This document contains the following chapters:

Section	Title	Description
Chapter 1	Overview	Describes the CSA and its LED displays.
Chapter 2	Preparing for Installation	Describes safety considerations, tools required, and procedures you should perform before the actual installation.
Chapter 3	Removing and Installing Service Adapters	Describes the procedures for installing and removing CSAs in the supported platforms.
Chapter 4	Configuring the SA-Comp/1 and SA-Comp/4	Provides instructions for configuring the CSA on the supported platforms.

Related Documentation

Your router and the Cisco IOS software running on it contain extensive features and functionality, which are documented in the following resources:

- Cisco IOS software:

  For configuration information and support, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

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

- Cisco 7000 series routers:

  For hardware installation and maintenance information, refer to the following publications:

  - *Cisco 7000 Hardware Installation and Maintenance* that shipped with your router.
  - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*
  - *Fourth-Generation Versatile Interface Processor (VIP4) Installation and Configuration*
  - *Versatile Interface Processor (VIP6-80) Installation and Configuration*

- Cisco 7200 series routers:
  - For port adapter hardware and memory configuration guidelines, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
  - For hardware installation and maintenance information (including the Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server), refer to the installation and configuration guide that shipped with your Cisco 7200 series router.

- Cisco 7500 series routers:

  For hardware installation and maintenance information, refer to the following publications:

  - *Cisco 7500 Installation and Configuration* or the quick start guide that shipped with your router
  - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*
  - Fourth-Generation Versatile Interface Processor (VIP4) Installation and Configuration
  - *Versatile Interface Processor (VIP6-80) Installation and Configuration*

- For international agency compliance, safety, and statutory information for WAN interfaces:
  - *Site Preparation and Safety Guide*
  - *Regulatory Compliance and Safety Information for the Cisco 7000 Series Routers*
  - Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers
  - Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers

- To view Cisco documentation or obtain general information about the documentation, refer to the following sources:
  - "Obtaining Documentation" section on page vii.
  - "Obtaining Technical Assistance" section on page viii.

- 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 Cisco-observed holidays). You can also send e-mail to cs-rep@cisco.com.
- *Cisco Information Packet* that shipped with your router.

Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

http://www.cisco.com

Translated documentation is available at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

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- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

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Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

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Obtaining Technical Assistance

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- Resolve technical issues with online support
- Download and test software packages
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- Register for online skill assessment, training, and certification programs

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http://www.cisco.com

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.

- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

http://www.cisco.com/register/

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC Web Site, you can open a case online by using the TAC Case Open tool at this URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Overview

This chapter describes the SA-Comp/1 and SA-Comp/4 service adapters (CSA) and contains the following sections:

- CSA Overview, page 1-1
- Data Compression Overview, page 1-2
- LEDs, page 1-3
- Service and Port Adapter Slot Locations on the Supported Platforms, page 1-4
- Identifying Interface Addresses, page 1-5

CSA Overview

The CSA provides high performance, hardware-based, data compression capabilities for Cisco 7200 series routers and VIP2 in the Cisco 7000 series and Cisco 7500 series routers. Following are the two CSA models:

- SA-Comp/1(=)—A 768-KB memory configuration, which supports up to 64 compression contexts (see Figure 1-1)
- SA-Comp/4(=)—A 3-MB memory configuration, which supports up to 256 compression contexts (see Figure 1-2)

Note There is one compression context for each PPP link and one compression context for each virtual circuit in a Frame Relay link.

Figure 1-1 SA-Comp/1—Faceplate View

Figure 1-2 SA-Comp/4—Faceplate View

There are no media interfaces on the CSA faceplate. The CSA off-loads all compression and decompression-related packet handling from host processors by compressing and decompressing packets passing through interfaces on serial port adapters installed in the host chassis.

Note See the "Software and Hardware Requirements" section on page 2-1 for the serial port adapters supported by the CSA.

The CSA supports simultaneous Stacker data compression algorithms, with independent full-duplex compression and decompression capabilities. The CSA supports only PPP and Frame Relay encapsulation.

Note While the VIP2 supports online insertion and removal (OIR), individual port adapters and service adapters do not. To replace a port adapter or service adapter, you must first remove the VIP2 from the router, and then replace adapters as required.

Cisco 7200 series routers support the OIR of all port adapter and service adapter types.

Data Compression Overview

The basic function of data compression is to reduce the size of a data frame transmitted over a network link. Reducing the size of the frame reduces the time required to transmit the frame across the network. Data compression works by providing a coding scheme at each end of a transmission link. This coding scheme allows characters to be removed from the frames of data at the sending side of the link and then replaced correctly at the receiving side. Because the condensed frames take up less bandwidth, greater numbers of them can be transmitted per unit of time.

Data compression schemes used in internetworking devices are referred to as lossless compression algorithms. These schemes reproduce the original bit streams exactly, with no degradation or loss, a feature required by routers and other devices to transport data across the network. The two most commonly used compression algorithms on internetworking devices are the Stacker compression and the Predictor data compression algorithms.

Stacker compression was developed by STAC Electronics and is based on the Lempel-Ziv compression algorithm. The Stacker algorithm uses an encoded dictionary that replaces a continuous stream of characters with codes. The symbols represented by the codes are stored in memory in a dictionary-style list. Because the relationship between a code and the original symbol varies as the data varies, this approach is more responsive to the variations in the data. This flexibility is particularly important for LAN data, because many different applications can be transmitting over the WAN at any one time. In addition, as the data varies, the dictionary changes to accommodate and adapt to the varying needs of the traffic.

Predictor compression was developed by Novell. The Predictor compression algorithm tries to predict the next sequence of characters in a data stream by using an index to look up a sequence in the compression dictionary. It then examines the next sequence in the data stream to see if it matches. If it

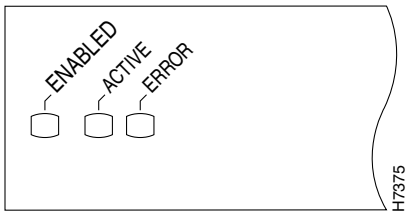
does, that sequence replaces the looked-up sequence in the dictionary. If there is no match, the algorithm locates the next character sequence in the index and the process begins again. The index updates itself by hashing a few of the most recent character sequences from the input stream.

Cisco internetworking devices use the Stacker and Predictor data compression algorithms. The CSA supports only the Stacker algorithm.

LEDs

The CSA has an enabled LED, standard on all service adapters, plus active and error LEDs. After system initialization, the enabled LED goes on to indicate that the CSA has been enabled for operation. (The LEDs are shown in Figure 1-3.)

Figure 1-3 LEDs on the CSA (Partial Faceplate View)



The following conditions must be met before the enabled LED goes on:

- The data compression interface is correctly connected to the backplane and receiving power.
- The CSA-equipped VIP2 contains a valid microcode version that has been downloaded successfully and the bus recognizes the CSA-equipped VIP2.

If either of these conditions is not met, or if the router initialization fails for other reasons, the enabled LED does not go on.

The CSA has the following LEDs and indications:

Table 1-1 CSA LEDs

LED Label	Color	State	Function
Enabled	Green	On	Compression service adapter is enabled for operation.
Active	Green	On	Indicates the CSA is active and ready to process data. This LED goes on when the service adapter's boot process is complete and remains off during normal system operation.
Error	Amber	On	Indicates an error was found, and if it remains on, it indicates the error might prevent accurate compression. Error codes are generated by software. This LED remains off during normal system operation.

Service and Port Adapter Slot Locations on the Supported Platforms

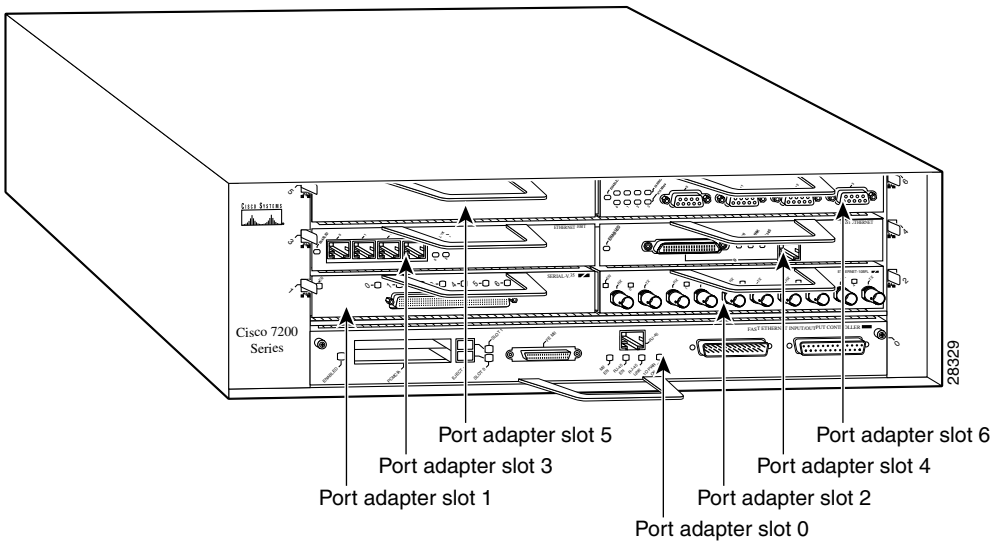
Cisco 7200 Series Routers Slot Numbering

Figure 1-4 shows a Cisco 7206 with port adapters installed. In the Cisco 7206 (including the Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server), port adapter slot 1 is in the lower left position, and port adapter slot 6 is in the upper right position. (The Cisco 7204 is not shown; however, the SA-Comp/1 and SA/Comp/4 can be installed in any available port adapter slot.)

Note The I/O controller is available with or without a Fast Ethernet port. You can install both I/O controller types in the Cisco 7204 and the Cisco 7206.

Note The Cisco 7202, Cisco 7204VXR, and Cisco 7206VXR do not support the CSA. See the "Software and Hardware Requirements" section on page 2-1 for information CSA requirements.

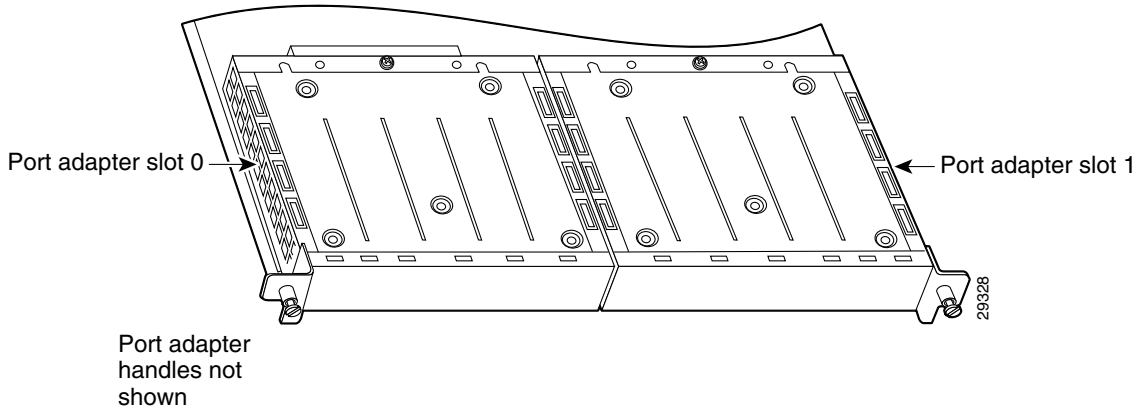
Figure 1-4 Port Adapter Slots in the Cisco 7206



VIP2 Slot Numbering

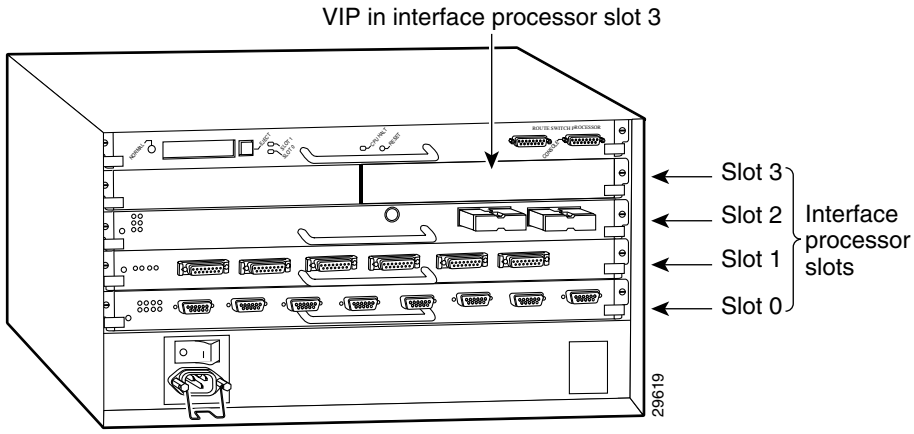
Figure 1-5 shows a partial view of a VIP motherboard with installed port or service adapters. With the motherboard oriented as shown in Figure 1-5, the left port adapter is in port adapter slot 0, and the right port adapter is in port adapter slot 1. The slots are always numbered 0 and 1.

Figure 1-5 VIP Motherboard with Two Port Adapters Installed—Horizontal Orientation



Note In the Cisco 7000, Cisco 7507, and Cisco 7513 chassis, the VIP motherboard is installed vertically. In the Cisco 7010 and Cisco 7505 chassis, the VIP motherboard is installed horizontally.

Figure 1-6 Interface Slot Numbers—Cisco 7505 shown



Identifying Interface Addresses

This section describes how to identify interface addresses for the SA-Comp/1 and SA-Comp/4 in supported platforms. Interface addresses specify the actual physical location of each interface on a router or switch.

Interfaces on the SA-Comp/1 and SA-Comp/4 installed in a router maintain the same address regardless of whether other port adapters are installed or removed. However, when you move a port adapter to a different slot, the first number in the interface address changes to reflect the new port adapter slot number.

Interfaces on an SA-Comp/1 and SA-Comp/4 installed in a VIP2 maintain the same address regardless of whether other interface processors are installed or removed. However, when you move a VIP2 to a different slot, the interface processor slot number changes to reflect the new interface processor slot.

Note Interface ports are numbered from left to right starting with 0.

Table 1-2 explains how to identify interface addresses.

Table 1-2 Identifying Interface Addresses

Platform	Interface Address Format	Numbers	Syntax
Cisco 7200 series routers	Port-adapter-slot-number/interface-port-number	Port adapter slot—0 through 6 (depends on the number of slots in the router)[1] Interface port—0 through 7	`1/0`
VIP2 in Cisco 7000 series or Cisco 7500 series routers	Interface-processor-slot-number/port-adapter-slot-number/interface-port-number	Interface processor slot—0 through 12 (depends on the number of slots in the router) Port adapter slot—always 0 or 1 Interface port—0 through 7	`3/1/0`

1. Port adapter slot 0 is reserved for the Fast Ethernet port on the I/O controller (if present).

Cisco 7200 Series and Routers Interface Addresses

This section describes how to identify the interface addresses used for the SA-Comp/1 and SA-Comp/4 in Cisco 7200 series routers. The interface address is composed of a two-part number in the format *port-adapter-slot-number/interface-port-number*. See Table 1-2 for the interface address format.

In Cisco 7200 series routers, port adapter slots are numbered from the lower left to the upper right, beginning with port adapter slot 1 and continuing through port adapter slot 2 for the Cisco 7202, slot 4 for the Cisco 7204, and slot 6 for the Cisco 7206. (Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller—if present.)

The interface addresses of the interfaces on the SA-Comp/1 or SA-Comp/4 in port adapter slot 1 are 1/0 through 1/7 (port adapter slot 1 and interfaces 0 through 7). If the SA-Comp/1 or SA-Comp/4 was in port adapter slot 4, these same interfaces would be numbered 4/0 through 4/7 (port adapter slot 4 and interfaces 0 through 7).

VIP2 Interface Addresses

This section describes how to identify the interface addresses used for the SA-Comp/1 and SA-Comp/4 on a VIP2 in Cisco 7000 series and Cisco 7500 series routers.

Note The Cisco 7202, Cisco 7204VXR, and Cisco 7206VXR do not support the CSA. See the "Software and Hardware Requirements" section on page 2-1 for information CSA requirements.

Note Although the processor slots in the 7-slot Cisco 7000 and Cisco 7507 and the 13-slot Cisco 7513 and Cisco 7576 are vertically oriented and those in the 5-slot Cisco 7010 and Cisco 7505 are horizontally oriented, all Cisco 7000 series and Cisco 7500 series routers use the same method for slot and port numbering.

Note The I/O controller is available with or without a Fast Ethernet port. You can install both I/O controller types in all Cisco 7200 series routers; however, when you install an I/O controller with a Fast Ethernet port in a Cisco 7202, the system software automatically disables the port.

See Table 1-2 for the interface address format. The interface address is composed of a three-part number in the format *interface-processor-slot number/port-adapter-slot-number/interface-port- number.*

If the VIP2 is inserted in interface processor slot 3, then the interface addresses of the *SA-Comp/1 and SA-Comp/4* are 3/1/0 through 3/1/7 (interface processor slot 3, port adapter slot 1, and interfaces 0 through 7). If the port adapter was in port adapter slot 0 on the VIP2, these same interface addresses would be numbered 3/0/0 through 3/0/7.

Note If you remove the VIP2 with the *SA-Comp/1 and SA/Comp/4* (shown in Figure 1-6) from interface processor slot 3 and install it in interface processor slot 2, the interface addresses become 2/1/0 through 2/1/7.

Preparing for Installation

This chapter describes the general equipment, safety, and site preparation requirements for installing the CSA. This chapter contains the following sections:

- Required Tools and Equipment, page 2-1
- Software and Hardware Requirements, page 2-1
- Checking Hardware and Software Compatibility, page 2-3
- Safety Guidelines, page 2-3
- FCC Class A Compliance, page 2-6

Required Tools and Equipment

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

- SA-Comp/1(=) or SA-Comp/4(=) service adapter.
- VIP2 (for installation in Cisco 7000 series or Cisco 7500 series chassis only). For information about the specific VIP2 models that support the SA-Comp/1 and SA-Comp/4, see the "Software and Hardware Requirements" section on page 2-1.
- Serial port adapter in the adjacent port adapter slot on the VIP2.
- Number 1 Phillips and a 3/16-inch flat-blade screwdriver (for VIP2 installation only).
- Your own electrostatic discharge (ESD)-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares.
- Antistatic mat.
- Antistatic container.

Software and Hardware Requirements

Table 2-1 lists the recommended minimum Cisco IOS software release required to use the SA-Comp/1 or SA-Comp/2 in supported router or switch platforms.

Table 2-1 CSA Software Requirements

Platform	Recommended Minimum Cisco IOS Release
Cisco 7000 series and Cisco 7500 series	
• With VIP2-40(=)	Cisco IOS Release 11.1(6)CA or a later release of Cisco IOS Release 11.1 CA
• With VIP2-50(=)	Cisco IOS Release 11.1(14)CA or a later release of Cisco IOS Release 11.1 CA
Cisco 7200 series	
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.1(6)CA or a later release of Cisco IOS Release 11.1 CA[1] Cisco IOS Release 12.2(4)B or a later release of Cisco IOS Release 12.2 B

1. For multiple CSA support in a Cisco 7204 or Cisco 7206, the router must be running Cisco IOS Release 11.1(8)CA1 or later.

Note The CSA requires that the host router is running Cisco IOS Release 11.1(6)CA or later to support PPP compression and Cisco IOS Release 11.3 ED or later to support Frame Relay compression.

The CSA supports PPP compression and Frame Relay compression on the PA-4T+ port adapter, and only supports PPP compression on the PA-4T.

Note The CSA is not supported in Cisco 7200 VXR routers (the Cisco 7204VXR and Cisco 7206VXR) or in the Cisco 7202. One of the following error messages is displayed if a CSA is installed in a Cisco 7200 VXR router:

PA-3-NOTSUPPORTED: PA in slot1 (Compression engine 3M) is not supported on this chassis
PA-3-NOTSUPPORTED: PA in slot1 (Compression engine 768K) is not supported on this chassis

The CSA can be used in the second-generation Versatile Interface Processor (VIP2) in all Cisco 7500 series routers and in Cisco 7000 series routers with the RSP7000 and RSP7000CI installed.

The specific minimum VIP2 model required for the CSA is VIP2-40(=), which has 2 MB of SRAM and 32 MB of DRAM. The CSA also operates with the VIP2-50(=), which has 4 to 8 MB of SRAM and 32 to 128 MB of SDRAM.

Note The CSA can be installed in port adapter slot 0 or slot 1 on a VIP2 motherboard; however, the CSA will *only* compress and decompress data passing through interfaces on the serial port adapter in the adjacent VIP2 port adapter slot.

The CSA can be installed in any available port adapter slot in a Cisco 7200 series chassis and will compress and decompress interfaces on serial port adapters installed in any other port adapter slot. The Cisco 7000 series, 7200 series, and 7500 series routers support multiple installed CSAs.

The CSA only supports the compression and decompression of data passing through synchronous serial interfaces that are configured for a peak line rate of 16 Mbps or below.

Note You can use the CSA to compress and decompress data passing through *any* synchronous serial interface; however, the serial interface must be configured to send and receive data at a rate no greater than 16 Mbps. For example, the CSA supports high-speed serial interfaces (such as HSSI) if the interfaces are configured for a peak line rate of 16 Mbps or below.

For configuration guidelines on port adapters in the Cisco 7200 series, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines.*

Checking Hardware and Software Compatibility

To check the minimum software requirements of Cisco IOS software with the hardware installed on your router, Cisco maintains the Software Advisor tool on Cisco.com. This tool does not verify whether modules within a system are compatible, but it does provide the minimum IOS requirements for individual hardware modules or components.

Note Access to this tool is limited to users with Cisco.com login accounts.

To access Software Advisor, click **Login** at Cisco.com and go to **Technical Support Help—Cisco TAC**: **Tool Index**: **Software Advisor**. You can also access the tool by pointing your browser directly to http://www.cisco.com/cgi-bin/support/CompNav/Index.pl.

Choose a product family or enter a specific product number to search for the minimum supported software release needed for your hardware.

Safety Guidelines

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

Safety Warnings

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

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

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

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

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

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

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

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

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

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

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

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 board component-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 (Mohm).

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.

- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Note The SA-Comp/1 and SA-Comp/4 service adapters have been designed to meet these requirements. Modifications to this product that are not authorized by Cisco Systems, Inc., could void the various approvals and negate your authority to operate the product.

Removing and Installing Service Adapters

This chapter describes how to remove the CSA from supported platforms and also how to install a new or replacement service adapter. This chapter contains the following sections:

- Handling Service Adapters, page 3-1
- Online Insertion and Removal, page 3-2
- Warnings and Cautions, page 3-3
- Service Adapter Removal and Installation, page 3-3

Each port adapter circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage.

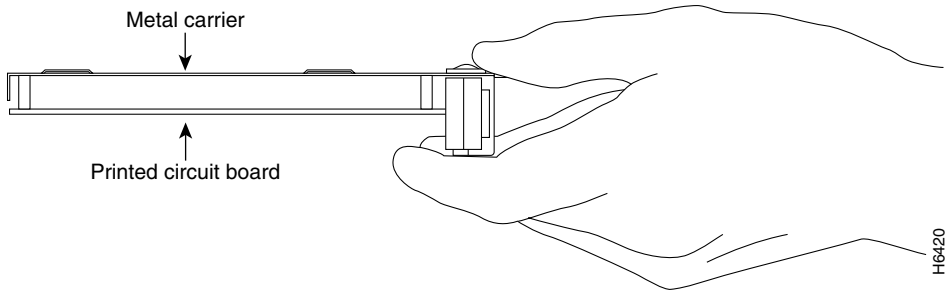
Note When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router or switch to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the port adapters. If you plan to install a new port adapter in a slot that is not in use, you must first remove the blank port adapter.

Caution When powering off the router, wait a minimum of 30 seconds before powering it on again.

Handling Service Adapters

Caution Always handle the port or service adapter by the carrier edges and handle; never touch the port adapter components or connector pins. (See Figure 3-1.)

Figure 3-1 Handling a Service Adapter



Online Insertion and Removal

Several platforms support online insertion and removal (OIR) of port adapters; therefore, you do not have to power down routers when removing and replacing a CSA on Cisco 7100 series routers, Cisco 7200 series routers, or Cisco uBR7200 series routers.

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

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

It is wise to gracefully shut down the system before removing a port adapter that has active traffic moving through it. Removing a module while traffic is flowing through the ports can cause system disruption. Once the module is inserted, the ports can be brought back up.

Note As you disengage the module from the router or switch, online insertion and removal (OIR) administratively shuts down all active interfaces in the module.

OIR allows you to install and replace modules while the router is operating; you do not need to notify the software or shut down the system power, although you should not run traffic through the module you are removing while it is being removed. OIR is a method that is seamless to end users on the network, maintains all routing information, and preserves sessions.

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a module in a supported platform, refer to the "Service Adapter Removal and Installation" section on page 3-3.

Each module has a bus connector that connects it to the router. The connector has a set of tiered pins in three lengths that send specific signals to the system as they make contact with the module. The system assesses the signals it receives and the order in which it receives them to determine if a module is being removed from or introduced to the system. From these signals, the system determines whether to reinitialize a new interface or to shut down a disconnected interface.

Specifically, when you insert a module, the longest pins make contact with the module first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them.

When you remove or insert a module, the pins send signals to notify the system of changes. The router then perfoms the following procedure:

1. Rapidly scans the system for configuration changes.
2. Initializes newly inserted port adapters or administratively shuts down any vacant interfaces.
3. Brings all previously configured interfaces on the module back to their previously installed state. Any newly inserted interface is put in the administratively shutdown state, as if it was present (but not configured) at boot time. If a similar module type is reinserted into a slot, its ports are configured and brought online up to the port count of the originally installed module of that type.

Note Before you begin installation, read Chapter 2, "Preparing for Installation," for a list of parts and tools required for installation.

Warnings and Cautions

Observe the following warnings and cautions when installing or removing service or port adapters.

Caution Do not slide a service or port adapter all the way into the slot until you have connected all required cables. Trying to do so disrupts normal operation of the router or switch.

Note If a service or port adapter lever or other retaining mechanism does not move to the locked position, the service or port adapter is not completely seated in the midplane. Carefully pull the service or port adapter halfway out of the slot, reinsert it, and move the service or port adapter lever or other mechanism to the locked position.

Caution To prevent jamming the carrier between the upper and the lower edges of the port adapter slot, and to ensure that the edge connector at the rear of the service or port adapter mates with the connection at the rear of the port adapter slot, make certain that the carrier is positioned correctly, as shown in the cutaway in the following illustrations.

Warning **When performing the following procedures, wear a grounding wrist strap to avoid ESD damage to the card. Some platforms have an ESD connector for attaching the wrist strap. Do not directly touch the midplane or backplane with your hand or any metal tool, or you could shock yourself.**

Service Adapter Removal and Installation

In this section, the illustrations that follow give step-by-step instructions on how to remove and install service adapters. This section contains the following illustrations:

- Cisco 7200 Series—Removing and Installing a Service Adapter, page 3-4
- VIP2—Removing and Installing a Service Adapter, page 3-5

Note The CSA can be installed in port adapter slot 0 or slot 1 on a VIP2 motherboard; however, the CSA will *only* compress and decompress data passing through interfaces on the serial port adapter in the adjacent VIP2 port adapter slot.

The CSA can be installed in any available port adapter slot in a Cisco 7200 series chassis and will compress and decompress interfaces on serial port adapters installed in any other port adapter slot. The Cisco 7000 series, 7200 series, and 7500 series routers support multiple installed CSAs.

Cisco 7200 Series—Removing and Installing a Service Adapter

Step 1

To remove the service adapter, place the port adapter lever in the unlocked position. (See A.) The port adapter lever remains in the unlocked position.

Step 2

Grasp the handle of the service adapter and pull the service adapter from the router. If you are removing a blank port adapter, pull the blank port adapter completely out of the chassis slot.

Step 3

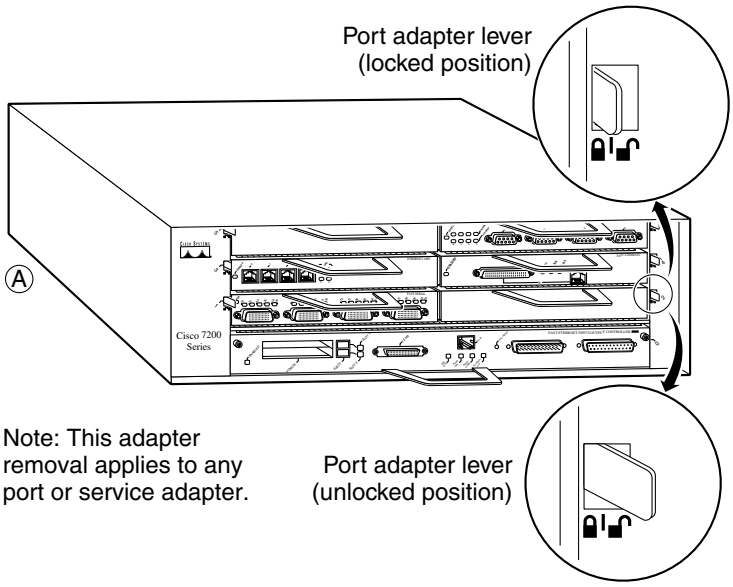
To insert the service adapter, carefully align the service adapter carrier between the upper and the lower edges of the port adapter slot. (See B.)

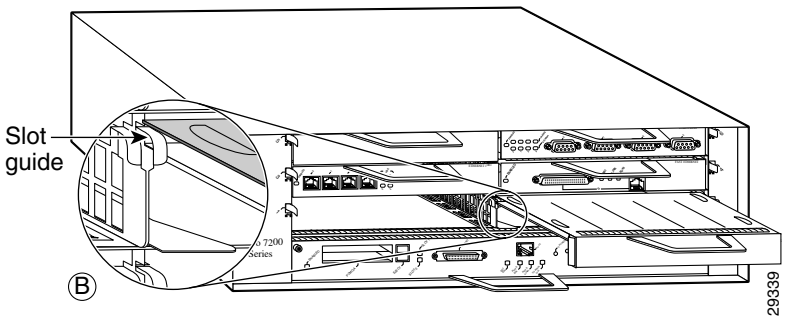
Step 4

Carefully slide the new service adapter into the port adapter slot until the service adapter is seated in the router midplane.

Step 5

After the service adapter is properly seated, lock the port adapter lever. (See A.)





VIP2—Removing and Installing a Service Adapter

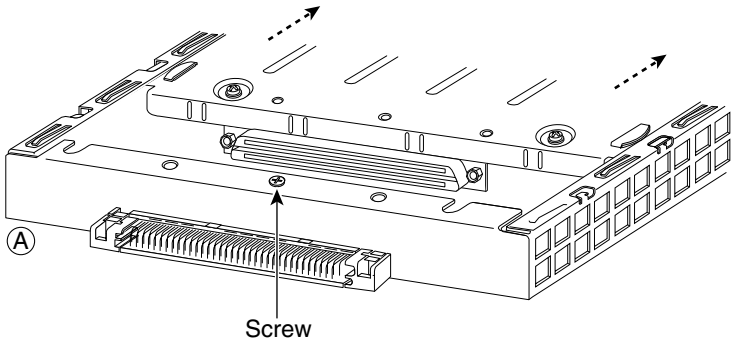
Note: You must first remove the VIP from the chassis before removing a service adapter from the VIP.

Step 1

To remove the service adapter, remove the screw that secures the service adapter (or blank port adapter). (See A.)

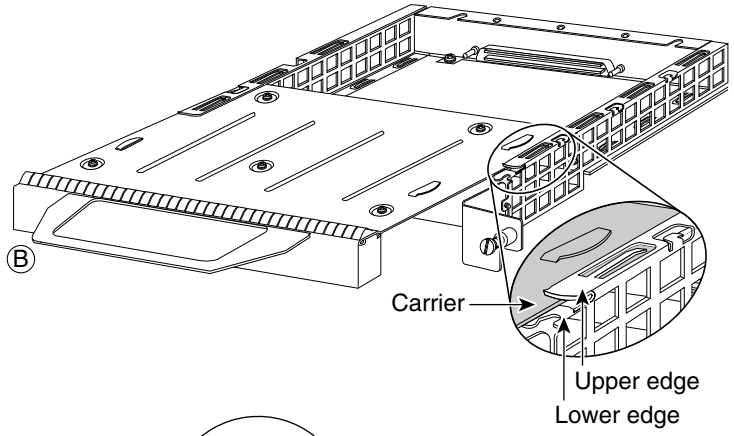
Step 2

With the screw removed, grasp the handle on the front of the service 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 A.)



Step 3

To insert the service adapter, carefully align the service adapter carrier between the upper and the lower edges of the port adapter slot. (See B.)



Step 4

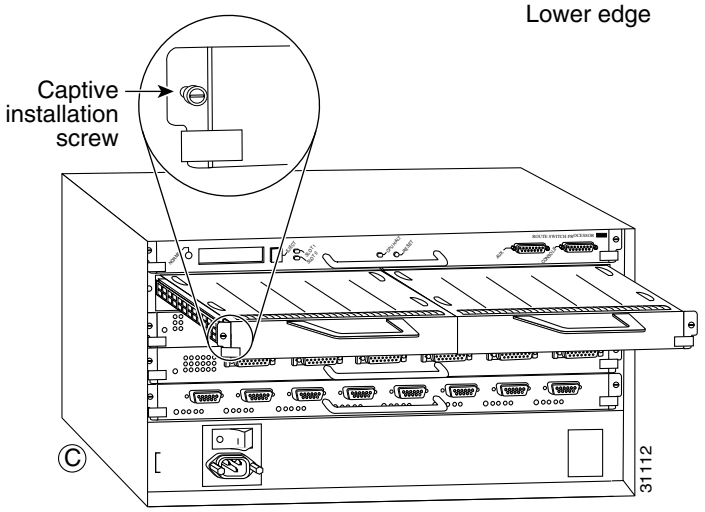
Install the screw in the rear of the port adapter slot. Do not overtighten the screw. (See A.)

Step 5

Carefully slide the new service adapter into the port adapter slot until the connector on the service adapter is completely seated in the connector at the rear of the port adapter slot. (See B.)

Step 6

Reinstall the VIP motherboard in the chassis, and tighten the captive installation screw on each end of the VIP faceplate. (See C.)



Configuring the SA-Comp/1 and SA-Comp/4

To continue your SA-Comp/1 and SA-Comp/4 service adapter installation, you must configure the *compression* interfaces. The instructions that follow apply to all supported platforms. Minor differences between the platforms—with Cisco IOS software commands—are noted.

This chapter contains the following sections:

- Using the EXEC Command Interpreter, page 4-1
- Configuring the Interfaces, page 4-2
- Checking the Configuration, page 4-12

Using the EXEC Command Interpreter

You modify the configuration of your router through the software command interpreter called the *EXEC* (also called enable mode). You must enter the privileged level of the EXEC command interpreter with the **enable** command before you can use the **configure** command to configure a new interface or change the existing configuration of an interface. The system prompts 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, use the following procedure to enter the privileged level:

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.

When you enter the correct password, the system displays the privileged-level system prompt (#):

```
Router#
```

To configure the new interfaces, proceed to the "Configuring the Interfaces" section on page 4-2.

Configuring the Interfaces

After you verify that the new SA-Comp/1 or SA-Comp/4 is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces.

Note Configure the serial port adapter that is used with the SA-Comp/1 or SA-Comp/4. The SA/Comp/1 or SA-Comp/4 is not configurable. The information in this section is for the serial port adapter that is used with the SA/Comp/1 or SA-Comp/4.

Have the following information available:

- Protocols you plan to route on each new interface
- IP addresses, if you plan to configure the interfaces for IP routing
- Bridging protocols you plan to use

If you installed a new SA-Comp/1 or SA-Comp/4 or if you want to change the configuration of an existing interface, you must enter configuration mode to configure the new interfaces. If you replaced a SA-Comp/1 or SA-Comp/4 that was previously configured, the system recognizes the new interfaces and brings each of them up in their existing configuration.

For a summary of the configuration options available and instructions for configuring interfaces on an SA-Comp/1 or SA-Comp/4, refer to the appropriate configuration publications listed in the "Related Documentation" section on page vi.

You execute configuration commands from the privileged level of the EXEC command interpreter, which usually requires password access. Contact your system administrator, if necessary, to obtain password access. (See the "Using the EXEC Command Interpreter" section on page 4-1 for an explanation of the privileged level of the EXEC.)

This section contains the following subsections:

- Shutting Down an Interface, page 4-2
- Performing a Basic Configuration, page 4-4
- Configuring Interfaces for Compression, page 4-6

Shutting Down an Interface

Before you remove an interface that you will not replace, or replace service adapters, use the **shutdown** command to shut down (disable) the interfaces to prevent anomalies when you reinstall the new or reconfigured interface processor. When you shut down an interface, it is designated *administratively down* in the **show** command displays.

Follow these steps to shut down an interface:

Step 1 Enter the privileged level of the EXEC command interpreter (also called enable mode). (See the "Using the EXEC Command Interpreter" section on page 4-1 for instructions.)

Step 2 At the privileged-level prompt, enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

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

Step 3 Shut down interfaces by entering the **interface serial** subcommand (followed by the interface address of the interface), and then enter the **shutdown** command. Table 4-1 shows the command syntax.

When you have finished, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter.

Table 4-1 Syntax of the shutdown Command

Platform	Command	Example

Cisco 7200 series routers	**interface**, followed by the *type* (**serial**) and *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 and interface 1 on a port adapter in port adapter slot 6.
		`Router(config-if)# interface serial 6/0`
		`Router(config-if)# shutdown`
		`Router(config-if)# interface serial 6/1`
		`Router(config-if)# shutdown`
		`Ctrl-Z`
		`Router#`

VIP2 in Cisco 7000 series or Cisco 7500 series routers	**interface**, followed by the *type* (**serial**) and *slot/port adapter/port* (interface-processor-slot-number/ port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1 of a VIP2 installed in interface processor slot 1.
		`Router(config-if)# interface serial 1/1/1`
		`Router(config-if)# shutdown`
		`Router(config-if)# interface serial 1/1/0`
		`Router(config-if)# shutdown`
		`Ctrl-Z`
		`Router#`

Note If you need to shut down additional interfaces, enter the **interface serial** command (followed by the interface address of the interface) for each of the interfaces on your port adapter. Use the **no shutdown** command to enable the interface.

Step 4 Write the new configuration to NVRAM as follows:

```
Router# copy running-config startup-config
[OK]
Router#
```

The system displays an OK message when the configuration has been stored in NVRAM.

Step 5 Verify that new interfaces are now in the correct state (shut down) using the **show interfaces** command (followed by the interface type and interface address of the interface) to display the specific interface. Table 4-2 provides examples.

Table 4-2 Examples of the show interfaces Command

Platform	Command	Example

Cisco 7200 series routers	**show interfaces serial**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 6.
		`Router# show interfaces serial 6/0`
		`Serial 6/0 is administratively down, line protocol is down`
		`[Additional display text omitted from this example]`

VIP2 in Cisco 7000 series or Cisco 7500 series routers	**show interfaces serial**, followed by *slot/port adapter/port* (interface-processor-slot-number/ port-adapter-slot-number/ interface-port-number)	The example is for interface 0 on a port adapter in port adapter slot 1 of a VIP2 in interface processor slot 1.
		`Router# show interfaces serial 1/1/0`
		`Serial 1/1/0 is administratively down, line protocol is down`
		`[Additional display text omitted from this example]`

Step 6 Reenable interfaces by doing the following:

a. Repeat Step 3 to reenable an interface. Substitute the **no shutdown** command for the **shutdown** command.

b. Repeat Step 4 to write the new configuration to memory. Use the **copy running-config startup-config** command.

c. Repeat Step 5 to verify that the interfaces are in the correct state. Use the **show interfaces** command followed by the interface type and interface address of the interface.

For complete descriptions of software configuration commands, refer to the publications listed in the "Related Documentation" section on page vi.

Performing a Basic Configuration

Following are instructions for a basic configuration: enabling an interface, and specifying IP routing. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available for compression interfaces, refer to the appropriate software documentation.

In the following procedure, press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable

Router>
```

Step 1 Enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

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

Step 2 Specify the first interface to configure by entering the **interface serial** subcommand, followed by the interface address of the interface you plan to configure. (The command for your port adapter may be different, for example, **interface atm**.) Table 4-3 gives examples.

Table 4-3 Examples of the interface serial Subcommand

Platform	Command	Example

Cisco 7200 series routers	**interface serial**, followed by *slot/port* (port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 6.
		`Router(config)# interface serial 6/0`
		`Router(config-if)#`

VIP2 in Cisco 7000 series or Cisco 7500 series routers	**interface serial**, followed by *slot/port adapter/port* (interface-processor-slot-number/ port-adapter-slot-number/ interface-port-number)	The example is for the first interface of a port adapter in port adapter slot 1 of a VIP2 in interface processor slot 1.
		`Router(config)# interface serial 1/1/0`
		`Router(config-if)#`

Step 3 Assign an IP address and subnet mask to the interface (if IP routing is enabled on the system) by using the **ip address** subcommand, as in the following example:

```
Router(config-if)# ip address 10.0.0.0 10.255.255.255
```

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

Step 5 Reenable the interfaces using the **no shutdown** command. (See the "Shutting Down an Interface" section on page 4-2.)

Step 6 Configure all additional port adapter interfaces as required.

Step 7 After including all of the configuration subcommands to complete your configuration, press **Ctrl-Z—**hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter prompt.

Step 8 Write the new configuration to NVRAM as follows:

```
Router# copy running-config startup-config
[OK]
Router#
```

This completes the procedure for creating a basic configuration.

Configuring Interfaces for Compression

The following sections explain how to use the CSA to configure PPP and Frame Relay compression on serial interfaces installed in Cisco 7200 series routers and the VIP2 in Cisco 7000 series and Cisco 7500 series routers.

This section contains the following subsections:

- Cisco 7200 Series Compression Configuration Specifics, page 4-6
- VIP2 Compression Configuration Specifics, page 4-7
- Configuring Interfaces for PPP Compression, page 4-7
- Configuring Interfaces for Frame Relay Compression, page 4-9

Cisco 7200 Series Compression Configuration Specifics

A CSA installed in a Cisco 7200 series router will compress interfaces on serial port adapters installed in any port adapter slot. For a Cisco 7200 series router that has an installed CSA, there are two methods for configuring PPP and Frame Relay compression:

- Software compression—Compression is implemented in the Cisco IOS release software installed in the router's main processor.
- Hardware compression—Compression is implemented in the CSA hardware installed in a port adapter slot. Hardware compression removes compression and decompression responsibilities from the main processor installed in your router.

Use the **compress stac** [*software*] command to configure PPP compression on interfaces. The **compress stac** command used without the *software* variable enables hardware PPP compression on a specified interface; if a CSA is not installed in the router, software PPP compression is enabled on the interface.

If your Cisco 7200 series router has an installed CSA, you can force software PPP compression on an interface using the **compress stac** software command.

When multiple CSAs are installed in a Cisco 7200 series router, you can specify the CSA a particular interface uses for hardware PPP compression by using the **compress stac csa** [*port adapter slot*] command.

Note To use the **compress stac csa** [*port adapter slot*] command, your Cisco 7204 or Cisco 7206 router must be running Cisco IOS Release 11.1(8)CA1, or a later release of 11.1 CA. The CSA is not supported in the Cisco 7200 VXR routers (the Cisco 7204VXR and Cisco 7206VXR) or in the Cisco 7202.

Use the **frame-relay map** *protocol protocol-address dlci* [*ietf|cisco*] **payload-compress frf9 stac** [**csa** *csa_number|software*] command to configure Frame Relay compression on an interface. Use the **frame-relay payload-compress frf9 stac** [**csa** *csa_number|software*] command to configure Frame Relay compression on a subinterface.

The **frame-relay map** *protocol protocol-address dlci* [*ietf|cisco*] **payload-compress frf9 stac** or the **frame-relay payload-compress frf9 stac** command used without variables enables hardware Frame Relay compression on a specified interface; if a CSA is not installed in the router, software Frame Relay compression is enabled on the interface.

When multiple CSAs are installed in a Cisco 7200 series router, you can specify the CSA a particular interface uses for hardware Frame Relay compression by using the **frame-relay map** *protocol protocol-address dlci* [*ietf|cisco*] **payload-compress frf9 stac csa** *csa_number* command or the CSA a particular subinterface uses for hardware Frame Relay compression by using the **frame-relay**

payload-compress frf9 stac csa *csa_number* command. You can also force software Frame Relay compression on an interface using the **frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac software** command or on a subinterface using the **frame-relay payload-compress frf9 stac software** command.

VIP2 Compression Configuration Specifics

A CSA installed in slot 0 or slot 1 of a VIP2 will only compress interfaces on the serial port adapter installed in the adjacent VIP2 slot. For Cisco 7000 and Cisco 7500 series routers that have an installed VIP2 with a CSA, there are three methods for configuring PPP and Frame Relay compression.

- Software compression—Compression is implemented in the Cisco IOS release software installed in the router's main processor.
- Distributed compression—Compression is implemented in software that is installed in a VIP2. Distributed compression removes compression and decompression responsibilities from the router's main processor and is supported only by Cisco 7000 series and Cisco 7500 series routers that have an installed VIP2.
- Hardware compression—Compression is implemented in the CSA hardware installed in a VIP2. Hardware compression removes compression and decompression responsibilities from the VIP2 or the main processor installed in your router.

Use the **compress stac** [*software*|*distributed*] command to configure PPP compression on interfaces. The **compress stac** command used without variables enables hardware PPP compression on a specified interface; if a CSA is not installed in the router, distributed compression is enabled on the interface; if a VIP2 is not installed in the router, software PPP compression is enabled on the interface.

If your Cisco 7000 or Cisco 7500 series router has an installed VIP2 with a CSA, you can force distributed PPP compression on an interface using the **compress stac distributed** command. You can also force software PPP compression on an interface using the **compress stac software** command.

Use the **frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac** [*software*|*distributed*] command to configure Frame Relay compression on an interface. Use the **frame-relay payload-compress frf9 stac** [*software*|*distributed*] command to configure Frame Relay compression on a subinterface.

The **frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac** or the **frame-relay payload-compress frf9 stac** command used without variables enables hardware compression on a specified interface; if a CSA is not installed in the router, distributed compression is enabled on the interface; if a VIP2 is not installed in the router, software compression is enabled on the interface.

If your Cisco 7000 or Cisco 7500 series router has an installed VIP2 with a CSA, you can force distributed Frame Relay compression on an interface using the **frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac distributed** command or on a subinterface using the **frame-relay payload-compress frf9 stac csa distributed** command. You can also force software Frame Relay compression on an interface using the **frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac software** command or on a subinterface using the **frame-relay payload-compress frf9 stac software** command.

Configuring Interfaces for PPP Compression

Use the following instructions to configure PPP compression on a serial interface using the **compress stac** [*software*|*distributed*] command. Press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable

Router>
```

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

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

Step 2 At the prompt, specify the interface you want to configure for compression.

- For the Cisco 7200 series, enter the subcommand **interface** followed by the *type* (**serial**) and *port-adapter-slot/interface- port-number*. The following example is for the first serial interface in port adapter slot 2:

  `Router(config)#` **interface serial 2/0**

- For the VIP2, enter the subcommand **interface** followed by the *type* (**serial**) and *slot/port adapter/interface port number*. The example that follows is for the first serial interface in port adapter slot 1 of a VIP2 in interface processor slot 3:

  `Router(config)#` **interface serial 3/1/0**

Step 3 Specify PPP encapsulation for the interface as follows:

```
Router(config-if)# encapsulation PPP
```

Note Hardware and distributed compression are only supported on PPP and Frame Relay links.

Step 4 If you are configuring a Cisco 7200 series router and multiple CSAs are installed in the router, use the **compress stac csa** [*port adapter slot*] command to specify the CSA that the interface will use for hardware compression. In the following example, a CSA in port adapter slot 3 is used:

```
Router(config-if)# compress stac csa 3
```

Step 5 Enter the **compress stac** [*software*] or **compress stac** [*software|distributed*] command as follows:

```
Router(config-if)# compress stac
```

Note The **compress stac** [*software*] command is supported on Cisco 7200 series routers whereas the **compress stac** [*software|distributed*] command is supported on the VIP2.

Step 6 Configure compression on any additional interfaces.

- For the Cisco 7200 series, enter the port adapter slot and port of each additional interface followed by the **compress stac** [*software*] command. When you have finished configuring compression on interfaces, press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter prompt as follows:

  `Router(config-if)#` **interface serial 2/1**
  `Router(config-if)#` **compress stac**
  `Router(config-if)#` **interface serial 2/2**
  `Router(config-if)#` **compress stac**

```
Ctrl-Z
Router#
```

- For the VIP2, enter the interface processor slot, port adapter, and port of each additional interface, followed by the **compress stac** [*software|distributed*] command. When you have finished configuring compression on interfaces, press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter prompt as follows:

```
Router(config-if)# interface serial 3/1/1
Router(config-if)# compress stac
Router(config-if)# interface serial 3/1/2
Router(config-if)# compress stac
Ctrl-Z
Router#
```

Step 7 Write the new configuration to memory as follows:

```
Router# copy running-config startup-config
[OK]
Router#
```

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

Step 8 Verify that compression is configured on the interfaces. To do so, use the **show compress** command to display the status of all interfaces in the system. See the "Checking the Configuration" section on page 4-12 for examples of the **show compress** command.

Step 9 To remove compression from the interfaces, repeat the previous steps, but use the **no compress** command in Step 5; and then write the new configuration to memory as in the following example for the VIP2:

```
Router(config)# interface serial 3/1/0
Router(config-if)# no compress
Ctrl-Z
Router#

Router# copy running-config startup-config
[OK]
```

After you remove compression from an interface, the interface will not appear in the output from the **show compress** command.

This completes the procedure for configuring PPP compression on a serial interface. To check the configuration of the interfaces, proceed to the "Checking the Configuration" section on page 4-12.

Configuring Interfaces for Frame Relay Compression

Following are instructions for configuring Frame Relay compression on interfaces using the **frame-relay map** *protocol protocol-address dlci* [*ietf|cisco*] **payload-compress frf9 stac** [**csa** *csa_number|software*] command and the **frame-relay map** *protocol protocol-address dlci* [*ietf|cisco*] **payload-compress frf9 stac** [*software|distributed*] command, and on subinterfaces using the **frame-relay payload-compress frf9 stac** [**csa** *csa_number|software*] command and the **frame-relay payload-compress frf9 stac** [*software|distributed*] command.

Before beginning the configuration, be prepared with the following information:

- Protocols you plan to route on each new interface
- Internet protocol (IP) addresses if you will configure the interfaces for IP routing
- The Data Link Connection Identifier (DLCI) number you will use to connect to the specified protocol address on the interface
- The Frame Relay encapsulation method you will use (IETF [the default] or Cisco) on each interface

Press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable
Router>
```

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

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

Step 2 At the prompt, specify the first interface or subinterface you want to configure for compression.

- For a Cisco 7200 series interface configuration, enter the subcommand **interface**, followed by the *type* (**serial**) and *port-adapter-slot/interface-port-number.*

  For a VIP2 interface configuration, enter the subcommand **interface**, followed by the *type* (**serial**) and *slot/port-adapter/interface-port-number.*

  The following example is for the first interface in port adapter slot 1 of a VIP2 in interface processor slot 3:

  `Router(config)#` **interface serial 3/1/0**

- *For a Cisco 7200 series subinterface configuration, enter the subcommand* **interface**, followed by the *type* (**serial**) and *port-adapter-slot/interface-port-number.subinterface-number* ***point-to-point***.

  For a VIP2 subinterface configuration, enter the subcommand **interface**, followed by the *type* (**serial**) and *slot/port-adapter/interface-port-number-subinterface-number* ***point-to-point***.

  The following example is for subinterface 100 of the first interface in port adapter slot 1 of a VIP2 in interface processor slot 3:

  `Router(config)#` **interface serial 3/1/0.100 point-to-point**

Step 3 Specify Frame Relay encapsulation for the interface or subinterface as follows:

```
Router(config-if)# encapsulation frame-relay
```

Note Hardware and distributed compression are only supported on Frame Relay and PPP links.

Step 4 Configure compression on the interface or subinterface.

- For a Cisco 7200 series interface configuration, enter the **frame-relay map** *protocol protocol-address dlci* [*ietf|cisco*] **payload-compress frf9 stac** [**csa** *csa_number|software*] command.

For a VIP2 interface configuration, enter the **frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac** [*software*|*distributed*] command.

The following example configures hardware-based Frame Relay compression on the interface (Cisco 7200 series or VIP2) specified in Step 2:

```
Router(config-if)# frame-relay map ip 10.1.1.1 105 ietf payload-compress frf9 stac
```

- For a Cisco 7200 series subinterface configuration, enter the **frame-relay payload-compress frf9 stac** [**csa** *csa_number*|*software*] command.

  For a VIP2 subinterface configuration, enter the **frame-relay payload-compress frf9 stac** [*software*|*distributed*] command.

  The following example configures hardware-based Frame Relay compression on the subinterface (Cisco 7200 series or VIP2) specified in Step 2:

```
Router(config-if)# frame-relay payload-compress frf9 stac
```

Step 5 Repeat Step 2 through Step 4 to configure compression on additional interfaces or subinterfaces. When you have finished, press **Ctrl-Z** (hold down the **Control** key while you press **Z**) or enter **end** to exit configuration mode and return to the EXEC command interpreter prompt.

Step 6 Write the new configuration to memory as follows:

```
Router# copy running-config startup-config
[OK]
Router#
```

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

Step 7 Verify that compression is configured on the interfaces. To do so, use the **show compress** command (displays the status of all interfaces in the system). See the "Checking the Configuration" section on page 4-12 for examples of the **show compress** command.

Step 8 To remove compression from the interfaces, repeat the previous steps, but use the **no frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac** [**csa** *csa_number*|*software*] command, **no frame-relay map** *protocol protocol-address dlci* [*ietf*|*cisco*] **payload-compress frf9 stac** [*software*|*distributed*] command, **no frame-relay payload-compress frf9 stac** [**csa** *csa_number*|*software*] command, or the **no frame-relay payload-compress frf9 stac** [*software*|*distributed*] command; then write the new configuration to memory as in the following example for the VIP2:

```
Router(config)# interface serial 3/1/0.100 point-to-point
Router(config-if)# no frame-relay map payload-compress frf9 stac
Ctrl-Z
Router#

Router# copy running-config startup-config
[OK]
```

After you remove compression from an interface, the interface will not appear in the output from the **show compress** command.

This completes the procedure for configuring Frame Relay compression on a serial interface or subinterface. To check the configuration of the interfaces, proceed to the next section "Checking the Configuration." For additional Frame Relay configuration information, refer to the chapter "Configuring Frame Relay" in the *Wide-Area Networking Configuration Guide* publication.

Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces, and use the **ping** and **loopback** commands to check connectivity. This section includes the following subsections:

- Using show Commands to Verify the New Interface Status, page 4-12
- Using the ping Command to Verify Network Connectivity, page 4-20

Using show Commands to Verify the New Interface Status

Table 4-4 demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the *SA-Comp/1 and SA-Comp/4* appears in them correctly. Sample displays of the output of selected **show** commands appear in the sections that follow. For complete command descriptions and examples, refer to the publications listed in the "Related Documentation" section on page vi.

Note The ouputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

Table 4-4 Using show Commands

Command	Function	Example
show version or **show hardware**	Displays system hardware configuration, the number of each interface type installed, Cisco IOS software version, names and sources of configuration files, and boot images	`Router# show version`
show controllers	Displays all the current interface processors and their interfaces	`Router# show controllers`
show diag *slot*	Displays types of port adapters installed in your system and information about a specific port adapter slot, interface processor slot, or chassis slot	`Router# show diag 2`
show interfaces *type* **0** or **1/** *interface-port-number*	Displays status information about a specific type of interface (for example, serial)	`Router# show interfaces serial 1/0`

Table 4-4 Using show Commands (continued)

Command	Function	Example
show interfaces *type* **3/***interface-port-number*	Displays status information about a specific type of interface (for example, serial) in a Cisco 7120 series router	`Router# show interfaces serial 3/1`
show interfaces *type* **4/***interface-port-number*	Displays status information about a specific type of interface (for example, serial) in a Cisco 7140 series router	`Router# show interfaces serial 4/1`
show interfaces *type* **1/***interface-port-number*	Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7223 router	`Router# show interfaces serial 1/1`
show interfaces *type* **1** or **2/** *interface-port-number*	Displays status information about a specific type of interface (for example, serial) in a Cisco uBR7246 router	`Router# show interfaces serial 2/0`
show interfaces *type interface-processor-slot-number/port-adapter-slot-number/ interface-port-number*	Displays status information about a specific type of interface (for example, serial) on a VIP2 in a Cisco 7000 series or Cisco 7500 series router	`Router# show interfaces serial 3/1/0`
show protocols	Displays protocols configured for the entire system and for specific interfaces	`Router# show protocols`
show running-config	Displays the running configuration file	`Router# show running-config`
show startup-config	Displays the configuration stored in NVRAM	`Router# show startup-config`

If an interface is shut down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the interface is properly connected and terminated. If you still have problems bringing up the interface, contact a service representative for assistance. This section includes the following subsections:

- Using the show version or show hardware Commands, page 4-14
- Using the show diag Command, page 4-16
- Using the show interfaces Command, page 4-17

Choose the subsection appropriate for your system. Proceed to the "Using the ping Command to Verify Network Connectivity" section on page 4-20 when you have finished using the **show** commands.

Using the show version or show hardware Commands

Display the configuration of the system hardware, the number of each interface type installed, the Cisco IOS software version, the names and sources of configuration files, and the boot images, using the **show version** (or **show hardware**) command.

Note The ouputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

Cisco 7200 Series Series Routers

Following is an example of the **show version** command from a Cisco 7200 series router with the *SA-Comp/1 and SA-Comp/4*:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Version 11.1(8)CA1
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sun 21-Apr-95 12:22 by
Image text-base: 0x600088A0, data-base: 0x605A4000

ROM: System Bootstrap, Version 11.1(8)CA1

Router uptime is 4 hours, 22 minutes
System restarted by reload
System image file is "slot0:c7200-j-mz.960421", booted via slot0

cisco 7206 (NPE150) processor with 12288K/4096K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software copyright 1990 by Meridian Technology Corp.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Chassis Interface.
4 Ethernet/IEEE 802.3 interfaces.
2 FastEthernet/IEEE 802.3 interfaces.
4 Token Ring /IEEE802.5 interfaces.
12 Serial network interfaces.
1 Compression port adapter.
125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2
```

VIP2 in Cisco 7000 Series and Cisco 7500 Series Routers

Following is an example of the **show version** command from a Cisco 7500 series router with the *SA-Comp/1 and SA-Comp/4*:

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-A), Version 11.1(6)CA [amcrae 125]
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Sat 10-Aug-96 17:56 by amcrae
```

```
Image text-base: 0x600108A0, data-base: 0x60952000

ROM: System Bootstrap, Version 5.3(16645) [szhang 571], INTERIM SOFTWARE
ROM: GS Software (RSP-BOOT-M), Version 11.1(6)CA, RELEASE SOFTWARE (fc1)

gshen_7500 uptime is 5 days, 4 minutes
System restarted by reload
System image file is "rsp-jv-mz", booted via slot0

cisco RSP2 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 33, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
SuperLAT software copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Chassis Interface.
1 EIP controller (6 Ethernet).
1 VIP2 controller (8 Serial)(1 Compression).
6 Ethernet/IEEE 802.3 interfaces.
1 HSSI network interface.
1 Compression port adapter.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

Using the show compression Command

Cisco 7200 Series Routers

Use the **show compress** command to determine which interfaces in the router are configured for compression (the **show compress** command displays only interfaces that are configured for compression). The **show compress** command displays all interfaces configured for compression, the type of compression configured on each interface, and the CSA that is compressing the interface's data.

In the following example, PPP compression and then Frame Relay compression information is displayed for the same serial interface (the first interface of the port adapter in slot 2):

```
Router# show compress
Serial2/0
     Hardware compression enabled
     CSA in slot 1 in use
     Compressed bytes sent:         4742 bytes   0 Kbits/sec  ratio: 10.700
     Compressed bytes recv:         5092 bytes   0 Kbits/sec  ratio: 10.009
     restarts: 1
     last clearing of counters: 348 seconds

Router# show compress
Serial2/0 - DCLI: 105
     Hardware compression enabled
     CSA in slot 1 in use
     Compressed bytes sent:         4742 bytes   0 Kbits/sec  ratio: 10.700
     Compressed bytes recv: 5092 bytes   0 Kbits/sec  ratio: 10.009
     restarts: 1
   last clearing of counters: 348 seconds
```

VIP2 in Cisco 7000 Series and Cisco 7500 Series Routers

To determine which interfaces in the router are configured for compression, use the **show compress** command. All interfaces configured for compression are displayed, as well as the type of compression configured on each interface and which CSA is in use (the **show compress** command only displays interfaces that are configured for compression). The following examples show the same interface (the first interface of the port adapter in slot 1 of a VIP2 in interface processor slot 3) configured for PPP compression and then Frame Relay compression:

```
Router# sh compress
Serial3/1/0
     Distributed h/w compression enabled
CSA in slot 3 in use
     Compressed bytes sent:      4932 bytes   0 Kbits/sec  ratio: 10.500
     Compressed bytes recv:      5019 bytes   0 Kbits/sec  ratio: 10.019
     restarts: 10
     last clearing of counters: 165828 seconds

Router# show compress
Serial3/1/0 - DLCI: 105
     Distributed h/w compression enabled
CSA in slot 3 in use
     Compressed bytes sent:      4942 bytes   0 Kbits/sec  ratio: 10.700
     Compressed bytes recv: 5029 bytes   0 Kbits/sec  ratio: 10.009
     restarts: 10
     last clearing of counters: 162528 seconds
```

Using the show diag Command

Display the types of port adapters installed in your system (and specific information about each) using the **show diag** *slot* command, where *slot* is the *port adapter slot* in a Cisco 7200 series router and the *interface processor slot* in a Cisco 7000 series or Cisco 7500 series router with a VIP2.

Note The ouputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

Cisco 7200 Series Routers

Following is an example of the **show diag** *slot* command that shows an SA-Comp/1 or SA-Comp/4 in port adapter slot 1 of a Cisco 7200 series router. Specific port adapter information is displayed, as shown in the following example of a CSA in chassis slot 1:

```
Router# show diag 1
Slot 1:
        Compression engine 768K port adapter, 0 ports
        Port adapter is analyzed
        Port adapter insertion time 00:16:37 ago
        Hardware revision 255.255               Board revision UNKNOWN
        Serial number     4294967295    Part number    255-65535-255
        Test history      0xFF          RMA number     255-255-255
        EEPROM format version 255
        EEPROM contents (hex):
          0x20: FF 09 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
          0x30: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```

If the previous displays indicate that the hardware is not functioning properly, ensure that the network interfaces are properly connected and terminated. If you still have problems bringing up or shutting down an interface, contact a customer service representative for assistance.

VIP2 in Cisco 7000 Series and Cisco 7500 Series Routers

Following is an example of the **show diag** *slot* command that shows an SA-Comp/1 or SA-Comp/4 in port adapter slot 0 on a VIP2 in interface processor slot 3:

```
Router# show diag 3
Slot 3:
        Physical slot 3, ~physical slot 0xF, logical slot 0, CBus 0
        Microcode Status 0x4
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: None
        EEPROM format version 1
        VIP2 controller, HW rev 2.1, board revision UNKNOWN
        Serial number: 03341394  Part number: 73-1684-02
        Test history: 0x00        RMA number: 00-00-00
        Flags: cisco 7000 board; 7500 compatible

        EEPROM contents (hex):
          0x20: 01 15 02 01 00 32 FC 52 49 06 94 02 00 00 00 00
          0x30: 07 2E 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

        Slot database information:
        Flags: 0x4      Insertion time: 0x8E11A48 (04:51:14 ago)

        Controller Memory Size: 8 MBytes DRAM, 1024 KBytes SRAM

        PA Bay 0 Information:
                Compression PA, 3M SRAM, 0 ports
                EEPROM format version 255
                HW rev FF.FF, Board revision UNKNOWN
                Serial number: 4294967295  Part number: 255-65535-255

        PA Bay 1 Information:
                Mueslix Serial PA, 8 ports
                EEPROM format version 1
                HW rev FF.FF, Board revision UNKNOWN
                Serial number: 4294967295  Part number: 255-65535-255
```

If the displays indicate that the hardware is not functioning properly, ensure that the network interfaces are properly connected and terminated. If you still have problems bringing up or shutting down an interface, contact a customer service representative for assistance.

Using the show interfaces Command

The **show interfaces** command displays status information (including the physical slot and interface address) for the interfaces you specify. All of the examples that follow specify serial interfaces.

For complete descriptions of interface subcommands and the configuration options available for **Cisco 7200 series and VIP2** interfaces, refer to the publications listed in the "Related Documentation" section on page vi.

Note The ouputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

Cisco 7200 Series Routers

Following is an example of the **show interfaces** command for Cisco 7200 series routers. The following examples show the same interface (the first interface of the port adapter in slot 2) configured for PPP compression and then Frame Relay compression (interfaces are administratively shut down until you enable them):

```
Router# show interfaces serial 2/0
Serial2/0 is up, line protocol is up
Hardware is M8T-V.35
  Internet address is 1.1.1.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set
(display text omitted]

Router# show interfaces serial 2/0
Serial2/0 is up, line protocol is up
Hardware is M8T-V.35
  Internet address is 1.1.1.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation FRAME-RELAY, loopback not set, keepalive not set
(display text omitted]
```

With the **show interfaces** *type-port-adapter-slot/interface-port-number* command, use arguments such as the interface type (serial, and so forth), port adapter slot, and the interface port number (port adapter slot/port) to display information about a specific serial interface only.

The following example of the **show interfaces serial** *port-adapter-slot/interface-port-number* command shows all of the information specific to the first PA-8T-V.35 interface port adapter in port adapter slot 2:

```
Router# show interfaces serial 2/0
Serial2/0 is up, line protocol is up
  Hardware is M8T-V.35
  Internet address is 1.1.1.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set
  LCP Open
  Open: ccp, ipcp, cdp
  Last input 00:00:07, output 00:00:05, output hang never
  Last clearing of "show interface" counters 3d23h
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     5743 packets input, 1886943 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     5743 packets output, 189253 bytes, 0 underruns
     0 output errors, 0 collisions, 4 interface resets
     0 output buffer failures, 0 output buffers swapped out
     4 carrier transitions     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
```

For complete command descriptions and examples, refer to the publications listed in the "Related Documentation" section on page vi.

Proceed to the next section, "Using the ping Command to Verify Network Connectivity," to check network connectivity of the *SA-Comp/1 or SA-Comp/4* and switch or router.

VIP2 in Cisco 7000 Series or Cisco 7500 Series Routers

Following is an example of the **show interfaces** command used with the VIP2. The following examples show the same interface (the first interface of the port adapter in slot 1 of a VIP2 in interface processor slot 3) configured for PPP compression and then Frame Relay compression (interfaces are administratively shut down until you enable them):

```
Router# show interfaces serial 3/1/0
Serial3/1/0 is up, line protocol is up
Hardware is cyBus Serial
  Internet address is 1.1.1.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set
(display text omitted]

Router# show interfaces serial 3/1/0
Serial3/1/0 is up, line protocol is up
Hardware is cyBus Serial
  Internet address is 1.1.1.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation FRAME-RELAY, loopback not set, keepalive not set
(display text omitted]
```

With the **show interfaces** *type slot/port-adapter/port* command, use arguments such as the interface type (serial, and so forth) and the slot, port adapter, and port numbers (slot/port adapter/port) to display information about a specific serial interface only.

The following example of the **show interfaces serial** *slot/port-adapter/port* command shows all of the information specific to the first PA-8T-V.35 interface port (interface port 0) in interface processor slot 3, port adapter slot 1:

```
Router# show interfaces serial 3/1/0
Serial3/1/0 is up, line protocol is up
  Hardware is cyBus Serial
  Internet address is 1.1.1.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set
  Last input 2d18h, output 00:00:54, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/64/0 (size/threshold/drops)
     Conversations  0/1 (active/max active)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     16 packets input, 1620 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 1 ignored, 0 abort
     3995 packets output, 1147800 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     1 carrier transitions
     RTS up, CTS up, DTR up, DCD up, DSR up
```

For complete VIP2 command descriptions and examples, refer to the publications listed in the "Related Documentation" section on page vi.

Proceed to the next section, "Using the ping Command to Verify Network Connectivity," to check network connectivity of the *SA-Comp/1 or SA-Comp/4* and switch or router.

Using the ping Command to Verify Network Connectivity

Using the **ping** command, you can verify that an interface port is functioning properly. This section provides a brief description of this command. Refer to the publications listed in the "Related Documentation" section on page vi for detailed command descriptions and examples.

The **ping** command sends echo request packets out to a remote device at an IP address that you specify. After sending an echo request, the system waits a specified time for the remote device to reply. Each echo reply is displayed as an exclamation point (!) on the console terminal; each request that is not returned before the specified timeout is displayed as a period (.). A series of exclamation points (!!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate a bad connection.

Following is an example of a successful **ping** command to a remote server with the address 10.0.0.10:

```
Router# ping 10.0.0.10 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.0.0.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#
```

If the connection fails, verify that you have the correct IP address for the destination and that the device is active (powered on), and repeat the **ping** command.