Performing a Basic Configuration of the System

This chapter describes the procedures for performing a basic configuration of your Cisco 7500 series router. It guides you through a basic router configuration, which is sufficient for you to access your network. Complex configuration procedures are beyond the scope of this text, and can be found in the configuration publications listed in the "If You Need More Configuration Information" section on page 4-32.

Note The Cisco IOS command examples in this chapter are from Release 11.1(8)CA. The examples might appear differently on your system depending on the Cisco IOS software release in use, and the router model being configured. If you are using an RSP8, note that it is only compatible with specific Cisco IOS 12.0 releases, examples of which are not included in this guide. Refer to the *Route Switch Processor (RSP8) Installation and Configuration Guide* for specific information on configuring a router equipped with an RSP8. When configuring a Cisco 7576, you will configure router A and then router B.

The following sections provide information for configuring your Cisco 7500 series router:

- Starting the System and Observing Initial Conditions, page 4-2
- Overview of Software Configuration Register Settings at Startup, page 4-3
- Configuring the Software Configuration Register, page 4-4
- Booting the Cisco 7500 Series Router for the First Time, page 4-8
- Using the Enable Secret and the Enable Password, page 4-8
- Recovering a Lost Password, page 4-9
- Configuring the Cisco 7500 Series System, page 4-11
- Implementing Other Configuration Tasks, page 4-19
- What Do I Do Now?, page 4-20
- Using the Flash Memory Cards in the RSPs, page 4-20
- If You Need More Configuration Information, page 4-32

To configure a Cisco 7500 series router from a console, you need to connect a terminal to the router's console port. Configuration requires access to the console port on each Route Switch Processor (RSP) in your router.

Note You should also use the companion publication *Interface Processor Installation and Configuration Guide* in conjunction with the basic configuration information in this chapter.

Starting the System and Observing Initial Conditions

This section describes the initial Cisco 7500 series system startup.

When all interfaces are connected, perform a final check of all connections and then power up the router as follows:

Step 1   Check the following components to make sure they are secure:

- Each interface processor is inserted all the way into its slot, and all of the captive installation screws are tightened.

- All interface cable connections are secured.

- Any installed Flash memory cards are secured in their PC Card slots.

- The system power cable is connected.

Step 2   Check the console terminal to make sure it is connected to the console port and turned on.

Step 3   Turn on the power supply by turning the system power switch to the on (|) position. The green AC (or DC) OK and fan OK LEDs on each power supply should go on. After a few seconds, the red output fail LED turns off.

Step 4   Listen for the system blower; you should immediately hear it operating. In a noisy environment, it is sometimes difficult to hear the fan or blower; place your hand in front of the exhaust vents to ensure that the fan or blower is on.

Step 5   Observe the normal LED indicator on the RSP. If this indicator is not on after system initialization, an error has occurred. If necessary, see Chapter 8, "Troubleshooting a Cisco 7500 Series Router," for troubleshooting procedures.

Step 6   Wait until the system boot is complete before attempting to verify the status of interface processor indicators. During the boot process, the LED indicators on most of the interfaces go on and off in irregular sequence. Some may go on, go out, and go on again for a short time. Some will stay on during the entire boot process if an interface is already configured and brought up, such as the EIP receive LED, which stays on as it detects traffic on the line.

Step 7   Observe the LED indicators on the interface processors in your system. When the system boot is complete (a few seconds), the RSP begins to initialize the interface processors. During this initialization, the indicators on each interface processor behave differently (most flash on and off).

The enabled LED on each interface processor goes on when initialization has been completed, and the console screen displays a script and system banner similar to the following:

```
GS Software (RSP-K), Version 11.1(8)CA
Copyright (c) 1986-1995 by Cisco Systems, Inc.
This RSP2 is system master
Other RSP2 is not plugged in
Compiled Wed 10-May-95 11:06
```

Step 8   Observe the system startup banner. When you start up the router for the first time, the system automatically enters the setup facility, which determines which interfaces are installed and prompts you for configuration information for each one. On the console terminal, after the system displays the system banner and hardware configuration, you will see the following System Configuration Dialog prompt:

```
        --- System Configuration Dialog ---
At any point you may enter a questions mark '?' for help.
Refer to the 'Getting Started' Guide for additional help.
Default settings are in square brackets '[]'. continue with
configuration dialog? [yes]:
```

You have the option of proceeding with the setup facility to configure the interfaces, or exit from setup and use configuration commands to configure global (system-wide) and interface-specific parameters. You do not have to configure the interfaces immediately; however, you cannot enable the interfaces or connect them to any networks until you have configured them.

Many of the interface processor LEDs will not go on until you have configured the interfaces. To verify correct operation of each interface, complete the first-time startup procedures and configuration, and then refer to the LED descriptions in the companion publication *Interface Processor Installation and Configuration Guide* to check the status of the interfaces.

If the system does not complete each of these steps, proceed to Chapter 8, "Troubleshooting a Cisco 7500 Series Router," for troubleshooting recommendations and procedures.

Overview of Software Configuration Register Settings at Startup

Bits 0 through 3 of the software configuration register form the *boot field*, specified as a binary number. The factory default configuration register setting for systems is 0x102; for RSP spares the default is 0x101.

When the boot field is set to either 0 or 1 (0-0-0-0 or 0-0-0-1), the system ignores any boot instructions in the system configuration file and the following occurs:

-   When the boot field is set to 1 (the factory default), the system boots the first image in the onboard bootflash single in-line memory module (SIMM).

-   When the boot field is set to 0, you must boot the operating system manually by giving a **boot** command to the system bootstrap program, or *ROM monitor.*

You can enter the **boot** command only, or include additional boot instructions with the command, such as the name of a file stored in Flash memory or a file that you specify for booting from a network server. If you use the **boot** command without specifying a file or any other boot instructions, the system boots from the default Flash image (the first image in onboard Flash memory). Otherwise, you can instruct the system to boot from a specific Flash image (using the **boot system flash** *filename* command), or boot from a network server by sending broadcast TFTP requests (using the **boot system** *filename* command), or by sending a direct TFTP request to a specific server (using the **boot system** *filename address* command).

You can also use the **boot** command to boot images stored in the PC Card Flash memory cards in the RSP. If you set the boot field to any bit pattern other than 0 or 1, the system uses the resulting number to form a filename for booting over the network.

The system uses the filename to invoke the system image by booting over the net. However, if the configuration file contains any boot instructions, the system uses those boot instructions instead of the filename it computed from the configuration register settings. You must set the boot field for the boot functions you require.

For more detailed information on the software configuration register features, see the next section, "Configuring the Software Configuration Register." For information on the **boot** command and function, see the "Booting the Cisco 7500 Series Router for the First Time" section on page 4-8.

Configuring the Software Configuration Register

Note   Appendix A, "Configuration Register Information" also provides configuration register information.

Cisco 7500 series routers use a 16-bit software configuration register, which allows you to set specific system parameters. Settings for the software configuration register are written into NVRAM.

Following are some reasons for changing the software configuration register settings:

- To select a boot source and default boot filename
- To enable or disable the Break function
- To control broadcast addresses
- To set the console terminal baud rate
- To load operating software from Flash memory
- To enable booting from a Trivial File Transfer Protocol (TFTP) server
- To recover a lost password
- To allow you to manually boot the system using the **boot** command at the bootstrap program prompt
- To force the router to boot automatically from the system bootstrap software (boot image) or from its default system image in onboard Flash memory, and read any **boot system** commands that are stored in the configuration file in NVRAM

Table 4-1 lists the meaning of each of the software configuration memory bits, and Table 4-2 defines the boot field.

Caution   To avoid confusion and possibly halting the router, remember that valid configuration register settings might be combinations of settings and not just the individual settings listed in Table 4-1. For example, the factory default value of 0x0101 is a combination of settings.

Table 4-1   Software Configuration Register Bit Meanings

Bit Number[1]	Hexadecimal	Meaning
00 to 03	0x0000 to 0x000F	Boot field
06	0x0040	Causes system software to ignore NVRAM contents
07	0x0080	OEM[2] bit enabled
08	0x0100	Break function disabled
09	0x0200	Use secondary bootstrap
10	0x0400	Internet Protocol (IP) broadcast with all zeros
11 to 12	0x0800 to 0x1000	Console line speed (default is 9600 baud)
13	0x2000	Boot default Flash software if network boot fails
14	0x4000	IP broadcasts do not have network numbers
15	0x8000	Enable diagnostic messages and ignore NVRAM contents

1. The factory default value for the configuration register is 0x0101.
   This value is a combination of the following: bit 8 = 0x0100 and bits 00 through 03 = 0x0001.

2.   OEM = original equipment manufacturer.

Table 4-2   *Explanation of Boot Field (Configuration Register Bits 00 to 03)*

Boot Field	Meaning
00	Stays at the system bootstrap prompt
01	Boots the first system image in onboard Flash memory
02 to 0F	Specifies a default network boot filename Enables boot system commands that override the default network boot filename

Configuration Register Bit Meanings

The lowest four bits of the software configuration register (bits 3, 2, 1, and 0) form the *boot field.* The boot field specifies a number in binary form. If you set the boot field value to 0, you must boot the operating system manually by entering the **b** command at the bootstrap prompt (>), as follows:

```
> b [tftp] flash filename
```

Definitions of the various **b** command options follow:

- **b**—Boots the default system software from Flash memory
- **b flash**—Boots the first file in onboard Flash memory
- **b slot0:** *filename*—Boots the file *filename* from the Flash memory card in PC Card slot 0
- **b slot1:** *filename*—Boots the file *filename* from the Flash memory card in PC Card slot 1
- **b** *filename* [*host*]—Boots from server *host* using TFTP
- **b flash:** [*filename*]—Boots the file *filename* from onboard Flash memory (abbreviated form of the **boot system flash** command shown below)

For more information about the **b** [**tftp** | **flash**] [*filename*] command, refer to the set of configuration fundamentals publications listed in the "If You Need More Configuration Information" section on page 4-32.

If you set the boot field value to *0x2* through *0xF* and there is a valid **boot system** command stored in the configuration file, the router boots the system software as directed by that value. If there is no **boot system** command, the router forms a default boot filename for booting from a network server. (See Table 4-3 for the format of these default filenames.)

In the following example, the software configuration register is set to boot the router from onboard Flash memory and to ignore the Break function at the next reboot of the router:

```
Router# conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# config-register 0x102
Router(config)# boot system flash [filename]
Crtl-Z
Router#
```

Table 4-3 lists the default boot filenames or actions for the processor.

✎

Note   A **boot system** configuration command in the router configuration in NVRAM overrides the default filename created for booting over the network.

Table 4-3   Default Boot Filenames

Action/Filename	Bit 3	Bit 2	Bit 1	Bit 0
Bootstrap mode	0	0	0	0
Default software	0	0	0	1
cisco2-RSP	0	0	1	0
cisco3-RSP	0	0	1	1
cisco4-RSP	0	1	0	0
cisco5-RSP	0	1	0	1
cisco6-RSP	0	1	1	0
cisco7-RSP	0	1	1	1
cisco10-RSP	1	0	0	0
cisco11-RSP	1	0	0	1
cisco12-RSP	1	0	1	0
cisco13-RSP	1	0	1	1
cisco14-RSP	1	1	0	0
cisco15-RSP	1	1	0	1
cisco16-RSP	1	1	1	0
cisco17-RSP	1	1	1	1

Bit 8 controls the console Break key. Setting bit 8 (the factory default) causes the processor to ignore the console Break key. Clearing bit 8 causes the processor to interpret the Break key as a command to force the system into the bootstrap monitor, thereby halting normal operation. Regardless of the setting of the break enable bit, a break will cause a return to the ROM monitor during the first few seconds (approximately 5 seconds) of booting.

Bit 9 is unused. Bit 10 controls the host portion of the IP broadcast address. Setting bit 10 causes the processor to use all zeros; clearing bit 10 (the factory default) causes the processor to use all ones. Bit 10 interacts with bit 14, which controls the network and subnet portions of the broadcast address.

Table 4-4 shows the combined effect of bit 10 and bit 14.

Table 4-4   Configuration Register Settings for Broadcast Address Destination

Bit 14	Bit 10	Address (<net> <host>)
Off	Off	<ones> <ones>
Off	On	<zeros> <zeros>
On	On	<net> <zeros>
On	Off	<net> <ones>

Bit 11 and bit 12 in the configuration register determine the data transmission rate of the console terminal. Table 4-5 shows the bit settings for the four available rates. (The factory-set default data transmission rate is 9600.)

Table 4-5   Console Terminal Transmission Rates

Baud	Bit 12	Bit 11
9600	0	0
4800	0	1
2400	1	1
1200	1	0

Bit 13 determines the server response to a bootload failure. Setting bit 13 causes the server to load operating software from Flash memory after five unsuccessful attempts to load a boot file from the network. Clearing bit 13 causes the server to continue attempting to load a boot file from the network indefinitely. By factory default, bit 13 is cleared to 0.

Changing Configuration Register Settings

To change the configuration register while running the system software, follow these steps:

Step 1   At the bootstrap prompt (>), enter the **enable** command and your password to enter privileged level, as follows:

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

Step 2   At the privileged-level system prompt (Router #), enter the **configure terminal** command to enter configuration mode. You are prompted, as shown in the following example:

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

Step 3   Set the contents of the configuration register by entering the **config-register** *value* configuration command, where *value* is a hexadecimal number preceded by 0x (see Table 4-1), as in the following example:

```
Router(config)# config-register 0xvalue
```

Step 4   Enter **Ctrl-Z** to exit configuration mode.

Step 5   Save the new settings to NVRAM by entering the **copy running-config startup-config** command. The new settings do not take effect until the system software is reloaded by rebooting the router.

Step 6   Display the configuration register value currently in effect and that will be used at the next reload by entering the **show version** EXEC command. The value is displayed on the last line of the screen display, as in the following example:

```
Configuration register is 0x141 (will be 0x101 at next reload)
```

Step 7   Reboot the router. The new value takes effect. Configuration register changes take effect only when the system reloads, such as when you issue a **reload** command from the console.

Booting the Cisco 7500 Series Router for the First Time

The router is administered using the Cisco command interpreter, called the EXEC. You must boot and log in to the router before you can enter an EXEC command. For security purposes the EXEC has two levels of access to commands: user EXEC mode and privileged EXEC mode.

To enter the privileged mode you must enter the enable secret password (which is optional, but must first have been saved in memory) on systems running Cisco IOS Release 10.2(3) or later, or the enable password on systems running Cisco IOS releases prior to Release 10.2(3) or when using the boot ROM software. At the ROM monitor prompt, view what is in onboard Flash memory using the following command (the Cisco IOS software image name shown is used as an example only):

```
rommon 1> dir bootflash:
   File size                 Checksum      File name
   3277967 bytes (0x32048f)  0x6b331e30    rsp-jv-mz.111-8
rommon 2>
```

Also, you can view contents of the Flash memory PC Card in slot 0 or slot 1 using the following command (the Cisco IOS software image name shown is used as an example only):

```
rommon 2> dir slot0:
   File size                 Checksum      File name
   3054276 bytes (0x2e9ac4)  0x97788495    rsp-jv-mz.111-8
rommon 3>
```

Boot from one of the images in Flash memory using the following commands (the Cisco IOS software image name shown is used as an example only):

```
rommon 3> boot slot0:rsp-jv-mz.111-8
rommon 3> boot slot1:rsp-jv-mz.111-8
rommon 3> boot bootflash:rsp-jv-mz.111-8
```

If you did not change the configuration register setting, the next reload will revert to the default configuration register setting. The factory default configuration register setting for systems is 0x102; for RSP spares the default is 0x101.

Using the Enable Secret and the Enable Password

The commands available at the user level are a subset of those available at the privileged level. Because many privileged-level EXEC commands are used to set operating parameters, you should password-protect these commands to prevent unauthorized use.

There are two commands you can use to do this, depending on which release of the Cisco IOS software you have:

  • **enable secret** *password* (which is a very secure, encrypted password)

  • **enable** *password* (which is a less secure, or nonencrypted, password)

The enable and enable secret password functionality is available in all Cisco IOS releases for the Cisco 7500 series routers. You must enter the correct password to gain access to privileged-level commands. When you are running from the boot ROM, the enable password might be used depending on your ROM level.

The passwords should be different for maximum security. If you enter the same password for both during the setup script, the system will accept it, but you will receive a warning message indicating that you should enter a different password.

An enable secret password can contain from 1 to 25 uppercase and lowercase alphanumeric characters; an enable password can contain any number of uppercase and lowercase alphanumeric characters. In both cases, a number cannot be the first character. Spaces are also valid password characters; for example, "two words" is a valid password. Leading spaces are ignored; trailing spaces are recognized.

Recovering a Lost Password

This section provides information on how to recover a lost password. Following is an overview:

- Enter the **show version** command to note the existing software configuration register value.
- Break to the bootstrap program prompt.
- Change the configuration register to ignore NVRAM.

> **Note**   A key to recovering a lost password is to set the configuration register so that the contents of NVRAM are ignored (0x0040), allowing you to see your password.

- Enter privileged level in the system EXEC.
- Enter the **show startup-configuration** command to display the enable password.
- Change the configuration register value back to its original setting.

To recover a lost password, use the following procedure:

> **Note**   If the enable password is encrypted, the following procedure will not work for password recovery. Instead, you will have to reconfigure the router using the displayed configuration.

Step 1   Attach an ASCII terminal to the router console port, which is located on the rear panel.

Step 2   Configure the terminal to operate at 9600 bps, 8 data bits, no parity, 2 stop bits.

Step 3   Enter the **show version** command to display the existing configuration register value. Note this value for later use in Step 13.

Step 4   If the Break function is disabled, power cycle the router. (To power cycle, turn off the router, wait 5 seconds, and then turn it on again.) If the Break function is enabled on the router, press the Break key or send a break (**^[**) signal and then proceed to Step 5.

Step 5   Within 5 seconds of turning on the router, press the **Break** key. This action causes the terminal to display the bootstrap program prompt:

```
rommon 1>
```

Step 6   Set the configuration register to ignore the configuration file information as follows:

```
rommon 1> confreg

    Configuration Summary
enabled are:
console baud: 9600
boot: image specified by the boot system command
    or default to: cisco2-RSP

do you wish to change the configuration? y/n [n]: y
enable "diagnostic mode"? y/n [n]:
enable "use net in IP bcast address"? y/n [n]:
```

```
enable "load rom after netbootfails"? y/n [n]:
enable "use all zero broadcast"? y/n [n]:
enable "break/abort has effect?" y/n [n]:
enable "ignore system config info?" [n]: y
change console baud rate? y/n [n]:
change boot characteristics? y/n [n]

    Configuration Summary
enabled are:
console baud: 9600
boot: image specified by the boot system command
    or default to: cisco2-RSP

do you wish to change the configuration? y/n [n]

You must reset or power cycle for the new config to take effect
```

Step 7   Initialize the router by entering the **i** command as follows:

```
rommon 1> i
```

The router will power cycle, the configuration register will be set to ignore the configuration file, and the router will boot the boot system image and prompt you with the system configuration dialog as follows:

```
--- System Configuration Dialog ---
```

Step 8   Enter **no** in response to the system configuration dialog prompts until the following system message is displayed:

```
Press RETURN to get started!
```

Step 9   Press **Return**. After some interface information displays, the prompt appears as follows:

```
Router>
```

Step 10   Enter the **enable** command to enter enabled mode. The prompt changes to the following:

```
Router#
```

Step 11   Enter the **show configuration** EXEC command to display the enable password in the configuration file.

Step 12   Enter the **configure terminal** command at the EXEC prompt. You are prompted as follows:

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

Step 13   Change the configuration register value back to its original value (noted from Step 3) or change it to a value of 0x0101 (factory default) using the **config-register** 0x *value* command.

Step 14   Exit configuration mode by entering **Ctrl-Z**.

Step 15   Reboot the router and enable it using the recovered password.

This completes the procedure for recovering a lost password.

Configuring the Cisco 7500 Series System

You can complete a basic configuration of the Cisco 7500 series system using one of the procedures described in the following sections:

- Performing a Basic Configuration Using AutoInstall, page 4-11
- Performing a Basic Manual Configuration Using the Setup Facility, page 4-12
- Performing a Basic Configuration Using Configuration Mode, page 4-18

Follow the procedure that best fits the needs of your network configuration.

Note You need to have the correct network addresses before you can complete the router configuration. You can obtain the information from your system administrator or you can consult your network plan to determine the correct addresses

Before continuing the configuration process, check the current state of the router using the **show version** command. The **show version** command displays the release of Cisco IOS software that is available on the router.

Performing a Basic Configuration Using AutoInstall

The AutoInstall process is designed to configure the router automatically after connection to your WAN. For AutoInstall to work properly, a TCP/IP host on your network must be preconfigured to provide the required configuration files. The TCP/IP host can exist anywhere on the network, as long as the following two conditions are maintained:

1. The host must be on the remote side of the router's synchronous serial connection to the WAN.

2. User Datagram Protocol (UDP) broadcasts to and from the router and the TCP/IP host must be enabled.

This functionality is coordinated by your system administrator at the site where the TCP/IP host is located. You should not attempt to use AutoInstall unless the required files have been provided on the TCP/IP host. Refer to the appropriate software configuration publications for information on how AutoInstall works.

Use the following procedure to prepare your router for the AutoInstall process:

Step 1 Attach the appropriate synchronous serial cable to a synchronous serial interface on the router.

Step 2 Turn on power to the router.

The router will load the operating system image from Flash memory. If the remote end of the WAN connection is connected and properly configured, the AutoInstall process will begin.

If the AutoInstall process is completed successfully, you might want to write the configuration data to the router's nonvolatile random-access memory (NVRAM). Perform the following step to complete this task.

Step 3 At the # prompt, enter the **copy running-config startup-config** command if you are running Cisco IOS Release 11.0 or later, or the **write memory** command if you are running a Cisco IOS release earlier than 11.0:

```
Hostname# copy running-config startup-config
```

Taking this step saves the configuration settings that the AutoInstall process created in the router. If you fail to do this, your configuration will be lost the next time you reload the router.

Performing a Basic Manual Configuration Using the Setup Facility

If you do not plan to use AutoInstall, do not connect the router's serial (WAN) cable to the CSU/DSU. This prevents the router from attempting to run the AutoInstall process. (The router will attempt to run AutoInstall whenever you start it if the serial [WAN] connection is connected on both ends and the router does not have a configuration stored in NVRAM.) It can take several minutes for the router to determine that AutoInstall is not set up to a remote TCP/IP host.

Once the router has determined that AutoInstall is not configured, it will default to the setup facility. If the serial (WAN) cable is not connected, the router will boot from Flash memory and go into the setup facility.

Note You can run the setup facility any time you are at the enable prompt (#) by entering the **setup** command.

Configuring the Global Parameters

When you first start the setup program, you must configure the global parameters, which are used for controlling system-wide settings.

Use the following procedure to enter the global parameters:

Step 1 Connect a console terminal to the console port on the RSP, and then boot the router to the user EXEC prompt (Router>). If you are using the console Y-cable that shipped with your router, use either of the two DB-25 male plug ends of the Y-cable.

Step 2 When you have booted from Flash memory, the following information will appear after about 30 seconds. When you see this information displayed, you have successfully booted your router:

```
System Bootstrap, Version 5.3(16645) [biff 571], RELEASED SOFTWARE
Copyright (c) 1994-1995 by cisco Systems, Inc.
This RSP2 is system master
Other RSP2 is not plugged in
RSP2 processor with 16384 Kbytes of main memory

Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
```

```
San Jose, California 95134-1706

Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-K-MZ), Version 11.1(8), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-1995 by cisco Systems, Inc.
Compiled Thu 14-Sep-95 19:03 by biff
Image text-base: 0x600087E0, data-base: 0x6052A000

RSP2 (R4600) processor with 16384K bytes of memory.
Manufactured 27-Dec-1995.  Blower serial 512.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
G.703/E1 software, Version 1.0.
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
1 EIP controller (2 Ethernet).
2 FSIP controllers (4 Serial).
2 Ethernet/IEEE 802.3 interfaces.
4 Serial network interfaces.
Chassis Interface.
125K bytes of non-volatile configuration memory.
8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Notice: NVRAM invalid, possibly due to write erase.

--- System Configuration Dialog ---

At any point you may enter a question mark '?' for help.
Refer to the 'Getting Started' Guide for additional help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
Would you like to enter the initial configuration dialog? [yes]:
```

Note   The first two sections of the preceding configuration script (the banner and the installed hardware) appear only at initial system startup. On subsequent uses of the setup facility, the script begins with the System Configuration Dialog.

Step 3   Enter **yes** or press **Return** when asked if you want to enter the configuration dialog and if you want to see the current interface summary. Press **Return** to accept the default (yes):

```
Would you like to enter the initial configuration dialog? [yes]:

First, would you like to see the current interface summary? [yes]:
```

In the following example, the summary shows a router at first-time startup. That is, nothing has been configured, and the summary reflects that fact.

```
Any interface listed with OK? value "NO" does not have a valid configuration.

Interface       IP-Address     OK?  Method     Status        Protocol
Ethernet0/0     unassigned     NO   not set    down           down
Serial1/0       unassigned     NO   not set    down          down
```

Step 4   Choose which protocols to support on your interfaces. For IP-only installations, you can accept the default values for most of the questions.

A typical minimal configuration using IP, IPX, and AppleTalk follows, and continues through Step 10:

```
Configuring global parameters:

  Enter host name [Router]: Router
```

Step 5 Enter the enable secret password and the enable password when the following is displayed:

```
The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

  Enter enable secret: barney

The enable password is used when there is no enable secret
and when using older software and some boot images.

  Enter enable password: betty
```

Note The Simple Network Management Protocol (SNMP) is the most widely supported open standard for network management. It provides a means to access and set configuration and run-time parameters of routers and communication servers. SNMP defines a set of functions that can be used to monitor and control network elements.

Step 6 Enter **yes** or **no** to accept or refuse SNMP management:

```
Configure SNMP Network Management? [yes]: yes
    Community string [public]:
```

Step 7 For the following query, do not enable CLNS:

```
Configure CLNS? [no]: no
```

Step 8 For the following queries, enable routing on AppleTalk and IPX:

```
Configure AppleTalk? [no]: yes
    Multizone networks? [no]: yes

Configure IPX? [no]: yes
```

Step 9 For the following queries, do not enable VINES, XNS, DECnet, or bridging:

```
Configure Vines? [no]: no
Configure XNS? [no]: no
Configure DECnet? [no]: no
Configure bridging? [no]: no
```

Step 10 In most cases you will use IP routing. If you are using IP routing, you must also select an interior routing protocol. You can specify only one of two interior routing protocols to operate on your system using the setup program: Interior Gateway Routing Protocol (IGRP) or Routing Information Protocol (RIP).

```
Enter yes (the default) or press Return to configure IP, and then select an interior
routing protocol for IP:
  Configure IP? [yes]:
    Configure IGRP routing? [yes]:
      Your IGRP autonomous system number [1]: 15
```

Note The following sample display includes a continuous listing of all configuration parameters selected in Step 4 through Step 10. These parameters are shown in the order in which they appear on your console terminal.

Only IP, IPX, and AppleTalk are the selected protocols for this example.

```
Configuring global parameters:

  Enter host name [Router]:
The enable secret is a one-way cryptographic secret used
```

```
instead of the enable password when it exists.

  Enter enable secret: barney

The enable password is used when there is no enable secret
and when using older software and some boot images.

Enter enable password: betty
Enter virtual terminal password: fred
Configure SNMP Network Management? [yes]:
Configure AppleTalk? [no]: y
Configure CLNS? [no]:
Configure IPX? [no]:
Configure Vines? [no]:
Configure XNS? [no]:
Configure DECnet? [no]:
Configure CLNS? [no]:
Configure bridging? [no]:
Configure IP? [yes]:
Configure IGRP routing? [yes]:
      Your IGRP autonomous system number [15]:
Configure Apollo? [no]:
```

Step 11   Save your settings to NVRAM. (For more information on saving settings to NVRAM, see the .)

Configuring Interfaces

This section provides procedures for configuring interfaces to allow communication over a LAN or WAN. To configure the interface parameters, you will need your interface network addresses and subnet mask information; consult your network administrator for this information.

Configuring an Ethernet Interface

Use the following procedure to configure an Ethernet interface:

Step 1   In the following example, the system is being configured for an Ethernet LAN using IP. Respond as follows to the setup prompts, using your own addresses and mask:

```
Configuring interface parameters:

Configuring interface Ethernet0/0:
  Is this interface in use? [no]: yes
  Configure IP on this interface? [no]: yes
    IP address for this interface: 10.1.1.10
    Number of bits in subnet field [0]:
    Class A network is 10.0.0.0, 0 subnet bits; mask is 255.0.0.0
```

Step 2   Determine if you are going to enable IPX on this interface. If yes, enter the unique IPX network number:

```
Configure IPX on this interface? [no]: yes
    IPX network number [2]:
```

Step 3   Enter **yes** if you want to use AppleTalk on the interface; enter **yes** to configure for extended AppleTalk networks, and then enter the cable range number and the zone name that is to be associated with your local zone:

```
Configure appletalk on this interface? [no]: yes
```

```
Extended appletalk network? [no]: yes
appletalk starting cable range [0]:
appletalk zone: zonename
```

Step 4   Save your settings to NVRAM. (For more information on saving settings to NVRAM, see the "Saving the Settings to NVRAM and Reviewing Your Configuration" section on page 4-19.) If additional Ethernet interfaces are available in your system, you are prompted for their configurations as well.

Configuring a Synchronous Serial Interface

The synchronous serial interfaces are configured to allow connection to WANs through a CSU/DSU.

Use the following procedure to configure a serial interface:

Step 1   Enter **yes** to configure serial port 0:

```
Configuring interface Serial1/0:
  Is this interface in use? [no]: yes
```

Step 2   Determine which protocols you want to allow on the synchronous serial interface and enter the appropriate responses:

```
Configure IP unnumbered on this interface? [no]:
    IP address for this interface: 10.1.1.20
    Number of bits in subnet field [0]:
    Class A network is 10.0.0.0, 0 subnet bits; mask is 255.0.0.0

Configure IPX on this interface? [no]: yes
    IPX network number [2]:

Configure AppleTalk on this interface? [no]: yes
    Extended AppleTalk network? [no]:
    AppleTalk network number [1]:
```

Step 3   Save your settings to NVRAM. (See the "Saving the Settings to NVRAM and Reviewing Your Configuration" section on page 4-19.) If additional synchronous serial interfaces are available in your system, you are prompted for their configurations as well.

Note   The following sample display includes a continuous listing of all interface configuration parameters selected for Ethernet and synchronous serial interfaces. These parameters are shown in the order in which they appear on your console terminal.

Only one Ethernet and one synchronous serial interface are configured for this example.

```
Configuring interface parameters:

Configuring interface Ethernet0/0:
  Is this interface in use? [no]: yes
  Configure IP on this interface? [no]: yes
    IP address for this interface: 10.1.1.10
    Number of bits in subnet field [0]:
    Class A network is 10.0.0.0, 0 subnet bits; mask is 255.0.0.0
  Configure IPX on this interface? [no]: yes
    IPX network number [2]: 10
```

```
    Configure AppleTalk on this interface? [no]: yes
      Extended AppleTalk network? [no]: yes
      AppleTalk starting cable range [0]:

Configuring interface Serial1/0:
  Is this interface in use? [no]: yes
  Configure IP on this interface? [no]: yes
  Configure IP unnumbered on this interface? [no]:
    IP address for this interface: 10.1.1.20
    Number of bits in subnet field [0]:
    Class A network is 10.0.0.0, 0 subnet bits; mask is 255.0.0.0
  Configure IPX on this interface? [no]: yes
    IPX network number [2]:
  Configure AppleTalk on this interface? [no]: yes
    Extended AppleTalk network? [no]:
    AppleTalk network number [1]:


The following configuration command script was created:

hostname Router
enable secret 5 $1$u8z3$PMYY8em./8sszhzk78p/Y0
enable password s
line vty 0 4
password s
snmp-server community public
ip routing
no vines routing
ipx routing
appletalk routing
no apollo routing
no decnet routing
no xns routing
no clns routing
no bridge 1
! Turn off IPX to prevent network conflicts.
interface Ethernet0/0
no ipx network
interface Ethernet0/1
no ipx network
!
interface Ethernet0/0
ip address 10.1.1.10 255.0.0.0
appletalk cable-range 0-0 0.0
appletalk discovery
no mop enabled
!
interface serial1/0
ip address 10.1.1.20 255.0.0.0
ip route-cache cbus
no keepalive
!
router igrp 15
network 1.0.0.0
!
end

Use this configuration? [yes/no]: yes
[OK]
Use the enabled mode 'configure' command to modify this configuration.

Press RETURN to get started!
```

Your Cisco 7500 series router is now minimally configured and ready to use. If you want to modify the parameters after the initial configuration, use the **setup** command. To perform more complex configurations, use the **configure** command.

For information on additional interface configuration and information on more specific system configurations, refer to the publications listed in the .

Performing a Basic Configuration Using Configuration Mode

You can configure the Cisco 7500 series router manually (through configuration mode) if you prefer not to use the setup facility or AutoInstall.

Use the following procedure to configure the router manually:

Step 1   Connect a console terminal to the console port of your RSP. If you are using the console Y-cable that shipped with your router, use either of the two DB-25 male plug ends of the Y-cable.

Step 2   When you are asked if you want to enter the initial dialog, answer **no** to go into the normal operating mode of the router, as follows:

```
Would you like to enter the initial dialog? [yes]: no
```

Step 3   After a few seconds you will see the user EXEC prompt (Router>). Type **enable** to enter enable mode. Configuration changes can only be made in enable mode.

```
Router> enable
```

The prompt will change to the privileged EXEC prompt, as follows:

```
Router#
```

Step 4   Enter the **config terminal** command at the enable prompt to enter configuration mode from the terminal, as follows:

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

At the Router(config)# prompt, enter the **interface** *type slot/port* command to enter interface configuration mode, as follows:

```
Router(config)# interface serial slot/port
Router(config-if)#
```

When you are in either of these configuration modes, you can enter any changes to the router configuration.

Step 5   Press **Ctrl-Z** to exit either configuration mode.

Step 6   Save your settings to NVRAM. (For more information on saving settings to NVRAM, see the .)

Your Cisco 7500 series router is now minimally configured and will boot with the configuration you have entered. To see a list of the configuration commands available to you, enter **?** at the prompt or press the **Help** key while in configuration mode.

Checking the Settings

You can check the value of the settings you entered by entering either of the following commands at the # prompt:

- **show running-config** (if you are running Cisco IOS Release 11.0 or later)
- **write terminal** (if you are running a Cisco IOS release earlier than Release 11.0)

Following is an example:

```
Router# show running-config
.
.
.
```

Saving the Settings to NVRAM and Reviewing Your Configuration

To store the configuration or changes to your startup configuration, enter the following commands at the `hostname#` prompt:

- **copy running-config startup-config** (if you are running Cisco IOS Release 11.0 or later)
- **write memory** (if you are running a Cisco IOS release earlier than Release 11.0)

Following is an example:

```
Hostname# copy running-config startup-config
```

Entering these commands will save the configuration settings that you created in the router using configuration mode. If you fail to do this, your configuration will be lost the next time you reload the router.

To display information stored in NVRAM, use the **show startup-config** EXEC command if you are running Cisco IOS Release 11.0 or later, or the **show config** EXEC command if you are running a Cisco IOS release earlier than Release 11.0.

Implementing Other Configuration Tasks

After you establish the basic startup configuration for your router, if you need to make more advanced configuration changes, see the "If You Need More Configuration Information" section on page 4-32 for a list of the appropriate configuration publications.

These publications contain additional information on using the **configure** command and provide additional information about the following tasks:

- Understanding and working with the user interface on your router
- Booting and rebooting the router
- Setting the configuration register
- Loading configuration files or system images using remote copy (rcp) or Trivial File Transfer Protocol (TFTP)
- Reloading the operating system

What Do I Do Now?

After you have installed the Cisco 7500 series router hardware, checked all external connections, turned on the system power, allowed the system to boot up, and minimally configured the system, you might need to perform more complete and complex configurations, which are beyond the scope of this text.

For specific information on more complex system and interface configuration and, if necessary, troubleshooting, refer to the publications listed in the "If You Need More Configuration Information" section on page 4-32.

Note For basic configuration information on each of the interface processors available for the Cisco 7500 series routers, refer to the companion publication *Interface Processor Installation and Configuration Guide*, or to the individual configuration notes that might have shipped with selected interface processors.

Using the Flash Memory Cards in the RSPs

This section describes procedures for using the Flash memory cards in the RSPs in the Cisco 7500 series routers.

Note The Flash memory card can be inserted and removed with the power on. In the following procedures, the term *RSP* refers to the RSP2, RSP4, and RSP8. Specific differences are clearly noted.

This section includes the following Flash memory card information:

- Installing and Removing a Flash Memory Card in an RSP, page 4-20
- Formatting a Flash Memory Card, page 4-24
- Copying Files to Flash Memory, page 4-25
- Making a Flash Memory Card Image Bootable, page 4-25
- Enabling Booting from Flash Memory, page 4-26
- Additional Commands Associated with Flash Memory, page 4-26
- Additional Procedures Associated with Flash Memory Cards, page 4-27

For additional Flash memory-related command descriptions and configuration information, refer to the *Cisco IOS Configuration Fundamentals Command Reference* and the *Cisco IOS Configuration Fundamentals Configuration Guide*. See the "If You Need More Configuration Information" section on page 4-32 for information on obtaining these publications.

You can also refer to the publication *Flash Memory Card Installation Instructions* (Document Number 78-2083-xx). This publication ships with Flash memory cards shipped as spare parts.

Installing and Removing a Flash Memory Card in an RSP

The RSP has two PC Card slots—slot 0 and slot 1—into which you can install a Flash memory card. In the RSP2, RSP4, and RSP8, the orientation is vertical. PC Card slot 0 is on the left and slot 1 is on the right. (See Figure 4-1 and Figure 4-2).

A Flash memory card can be inserted and removed with the system power on. Both PC Card slots can be used at the same time.

The following procedure is generic, and can be used for a Flash memory card in either slot position.

Use the following procedure to install and remove a Flash memory card:

Step 1 Face the front panel of the RSP, which should appear as shown in Figure 4-1a or Figure 4-2a, and hold the Flash memory card with the connector end of the card toward the slot.

In an RSP2, RSP4, or RSP8, the label should face right, with the Flash memory card positioned as shown in Figure 4-1 or Figure 4-2.

Note The Flash memory card is keyed and cannot be seated the wrong way. The ejector button will not pop out if the card is not properly inserted.

Step 2 Insert the card into the appropriate slot until the card completely seats in the connector at the back of the slot and the ejector button pops out toward you.

Step 3 Note that the card does not insert all the way inside the RSP; a portion of the card remains outside of the slot. *Do not attempt to force the card past this point.*

Step 4 To eject the card, press the appropriate ejector button until the card is free of the connector at the back of the slot.

Step 5 Remove the card from the slot and place it in an antistatic bag to protect it.

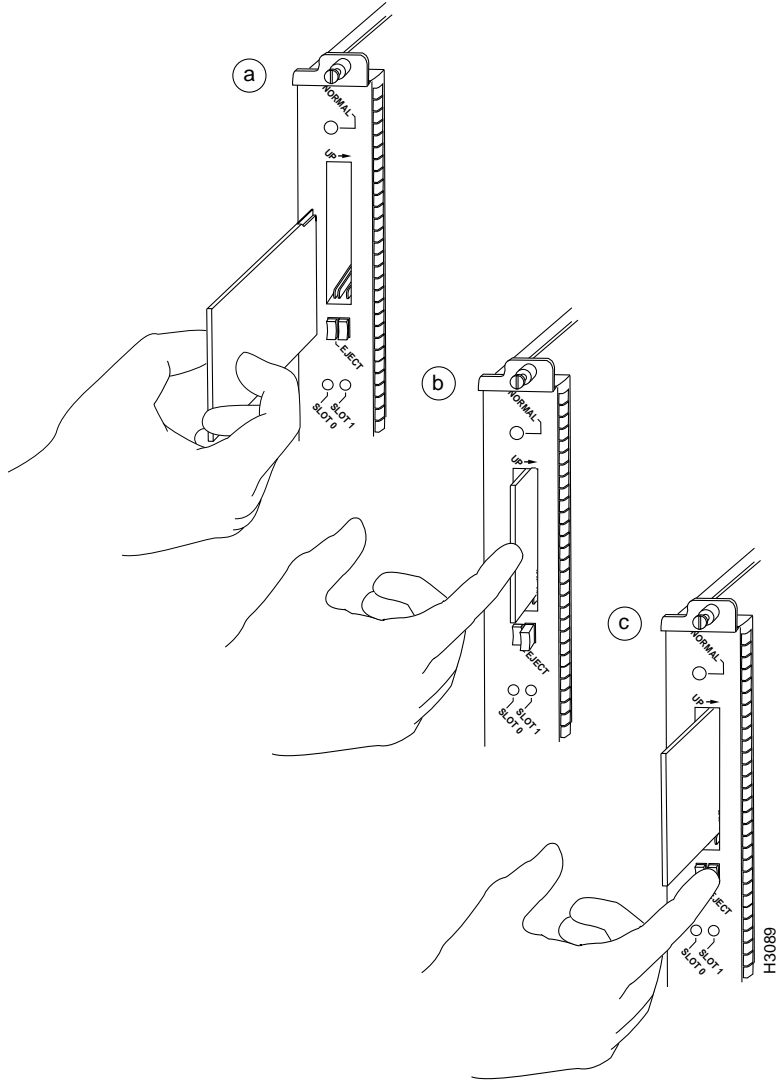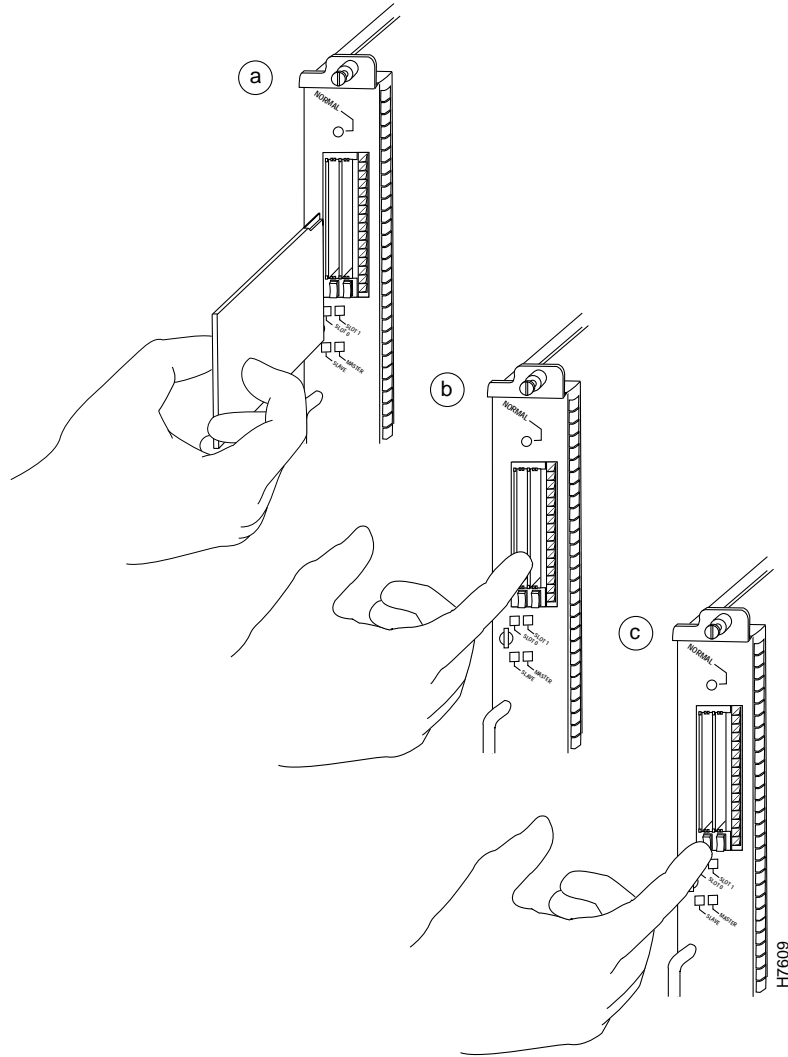*Figure 4-1*   *Installing and Removing a Flash Memory Card (RSP2)*

Figure 4-2   Installing and Removing a Flash Memory Card (RSP4/4+ and RSP8)

The following sections include additional procedures for using Flash memory and Flash memory cards.

The following procedures are required if you do not plan to use the Flash memory card as it was shipped to you:

- Formatting a Flash Memory Card, page 4-24
- Copying Files to Flash Memory, page 4-25
- Making a Flash Memory Card Image Bootable, page 4-25
- Enabling Booting from Flash Memory, page 4-26

The following information is included for reference:

- Additional Commands Associated with Flash Memory, page 4-26
- Additional Procedures Associated with Flash Memory Cards, page 4-27

Formatting a Flash Memory Card

A Flash memory card that shipped with your chassis contains the Cisco IOS software image you need to boot your router. You do not need to reformat it.

In some cases, you might need to insert a new Flash memory card and copy images or back up configuration files onto it. Flash memory cards shipped as spare parts are shipped unformatted and blank. Before you can use a new blank Flash memory card, you must format it. Use only Intel Series 2+ Flash memory cards.

> **Note** For a Flash memory card that was formatted on an RSP1, RSP2, or RSP7000 to be compatible in an RSP4, the Flash memory card must be formatted with a boot or Cisco IOS software image that is compatible with the RSP4.
>
> Currently the Cisco IOS release required for Flash memory card compatibility with all RSPs is Cisco IOS Release 11.1(8)CA1 or a later release of 11.1 CA.

> **Caution** To prevent system problems, use Flash memory cards in the RSP4 that were formatted on an RSP1, RSP2, RSP7000, or RSP4 running Cisco IOS Release 11.1(8)CA1 or a later release of 11.1 CA.

> **Caution** The following formatting procedure erases all information on the Flash memory card. To prevent the loss of important data that might be stored on a Flash memory card, proceed carefully. If you want to save the data on a Flash memory card, copy the data to a server before you format the card.

Use the following procedure to format a new Flash memory card (the procedure assumes you have already booted your router):

Step 1 Using the procedure in the "Installing and Removing a Flash Memory Card in an RSP" section on page 4-20, insert the Flash memory card into slot 0. (If slot 0 is not available, use slot 1.)

Step 2 To format the Flash memory card, use the **format slot0:** (or **format slot1:**) command as follows:

```
Router# format slot0:
All sectors will be erased, proceed? [confirm]
Enter volume id (up to 30 characters): MyNewCard
Formatting sector 1
Format device slot0 completed
Router#
```

> **Note** For this example, an 8-MB Flash memory card was used, and at the line "Formatting sector," the system counted the card's sectors backward from 64 to 1 as it formatted them. For 16-MB Flash memory cards, the system counts backward from 128 to 1, and for 20-MB Flash memory cards, the system counts backward from 160 to 1.

The new Flash memory card is now formatted and ready to use.

Copying Files to Flash Memory

You might need to copy a new image file to Flash memory whenever a new Cisco IOS software release or maintenance release becomes available.

⚠️

Caution   You *cannot* copy a new image into Flash memory while the system is running from Flash memory.

We recommend that you upgrade Cisco IOS software images in Flash memory one at a time; do not delete all known-good images at one time. Also, upgrade PC Card-based Flash memory separately from onboard Flash memory, to avoid losing important Cisco IOS software images that are known to be good. (The onboard Flash memory is referred to as the *bootflash*.)

Use the command **copy tftp:***filename* [**bootflash** | **slot0** | **slot1**]: *filename* for the copy procedure, where **tftp:***filename* is the source of the file and [**bootflash** | **slot0** | **slot1**]: *filename* is the destination in onboard Flash memory or on either of the Flash memory cards.

An example of the **copy tftp:***filename* command follows for a file in the Flash memory card in PC Card slot 0:

```
Router# copy tftp:myfile1 slot0:myfile1
20575008 bytes available on device slot0, proceed? [confirm]
Address or name of remote host [10.1.1.1]?
Loading new.image from 10.1.1.1 (via Ethernet1/0): !!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
![OK - 7799951/15599616 bytes]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Router#
```

✎

Note   In the preceding example, the exclamation points (!!!) appear as the file is downloaded, and the "C" characters signify calculation of the checksum, which is a verification that the file has been correctly downloaded to the Flash memory card.

Making a Flash Memory Card Image Bootable

Use the following series of commands to make a Flash memory card image bootable. (In this example, the filename is *new.image*.) Note that the **config-register** command is part of the sequence because the configuration register must be set to 0x2102 to enable loading an image from Flash memory.

```
Router# config terminal
Router(config)# no boot system
Router(config)# boot system flash slot0:new.image
Router(config)# config-register 0x2102
Crtl-Z
Router# copy running-config startup-config
Router# reload
```

When the system reloads, it will boot the image *new.image* from the Flash memory card in slot 0.

Enabling Booting from Flash Memory

To enable booting from Flash memory, set configuration register bits 3, 2, 1, and 0 to a value between 2 and 15 in conjunction with the **boot system flash** *device:filename* configuration command, where *device* is **bootflash:**, **slot0:**, or **slot1:**, and *filename* is the name of the file from which you want to boot the system. (For detailed configuration register information, see the "Configuring the Software Configuration Register" section on page 4-4.)

To enter configuration mode while in the system software image and specify a Flash filename from which to boot, enter the **configure terminal** command at the enable prompt, as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# boot system flash device:filename
```

To disable the Break function and enable the **boot system flash** *device:filename* command, enter the **config-register** command with the value shown in the following example:

```
Router(config)# config-reg 0x0100
Crtl-Z
Router#
```

Additional Commands Associated with Flash Memory

This section describes additional commands related to using the onboard Flash memory (bootflash) on the RSP and the Flash memory cards (PC Card slot 0 and slot 1). The following examples assume you have Flash memory cards in PC Card slot 0 and slot 1.

You can determine which memory media you are accessing using the **pwd** command, as follows:

```
Router# pwd
slot1
```

You can move between Flash memory media using the **cd** [**bootflash** | **slot0** | **slot1**] command, as follows:

```
Router# cd slot0
slot0
Router# cd slot1
Router# pwd
slot1
```

You can list the directory of Flash memory media using the **dir** [**bootflash** | **slot0** | **slot1**] command, as follows:

```
Router# dir
-#- -length- -----date/time------ name
1   4601977  May 10 1996 09:42:19 myfile1
6   679      May 10 1996 05:43:56 todays-config
7   1        May 10 1996 09:54:53 fun1
```

You can delete a file from any Flash memory media using the **delete** [**bootflash** | **slot0** | **slot1**]:*filename* command, as follows:

```
Router# delete slot0:fun1
Router# dir
-#- -length- -----date/time------ name
1   4601977  May 10 1996 09:42:19 myfile1
```

Files that are deleted are marked as deleted, but still occupy space in Flash memory. The **squeeze** command removes them permanently and pushes all other undeleted files together to eliminate spaces between them.

Following is the syntax of the squeeze command:

```
Router# squeeze slot0:
All deleted files will be removed, proceed? [confirm]
Squeeze operation may take a while, proceed? [confirm]
ebESZ
```

To prevent loss of data due to sudden power loss, the "squeezed" data is temporarily saved to another location of Flash memory, which is specially used by the system.

In the preceding command display output, the character "e" means this special location has been erased (which must be performed before any write operation). The character "b" means that the data that is about to be written to this special location has been temporarily copied. The character "E" signifies that the sector that was temporarily occupied by the data has been erased. The character "S" signifies that the data was written to its permanent location in Flash memory. The **squeeze** command operation keeps a log of which of these functions has been performed so in case of a sudden power failure, it can come back to the right place and continue with the process. The character "Z" means this log was erased after the successful **squeeze** command operation.

The configuration register setting 0x0101 tells the system to boot the default image (the first image) from onboard Flash memory, but *not* reset the Break function disable or check for a default filename to be booted over the network. The configuration register setting 0x0102 tells the system to boot from Flash memory if a network boot fails, disable the Break function, and check for a default filename to boot over the network.

For more information on the **copy tftp:***filename* [**flash** | **slot0** | **slot1**]:*filename* command, and other related commands, refer to the set of configuration fundamentals configuration and reference publications listed in the "If You Need More Configuration Information" section on page 4-32.

Additional Procedures Associated with Flash Memory Cards

This section describes additional procedures that can be used with Flash memory cards but are not always required.

Copying a Bootable Image into a Flash Memory Card

You can copy a bootable image into Flash memory; however, you must first format the Flash memory card and make the image in the Flash memory card bootable. (If you have not already done these tasks, see the "Formatting a Flash Memory Card" section on page 4-24 and the "Making a Flash Memory Card Image Bootable" section on page 4-25.)

To copy an image, use the following procedure, which assumes:

- You have a formatted Flash memory card in your RSP.
- You have a good, bootable image in the onboard Flash memory so you can start the router.
- The bootable image you want to copy to the Flash memory card exists on a TFTP server to which you have access (meaning you know its name and have connectivity to it), and at least one interface is available over which you can access this server.

   To ensure access to a TFTP server, you need to configure at least one interface using the setup facility. For instructions on using this procedure, refer to the *Configuration Fundamentals Configuration Guide* publication.

- You know the filename of the image you want to copy into the Flash memory card.

Following is the procedure for copying a bootable file (called *new.image*) into the Flash memory card:

Step 1   Boot the router and allow it to initialize.

Note   If you have already formatted a Flash memory card, you can use it instead; however, with an RSP4, you cannot boot from or use a Flash memory card formatted on another type of system (including the RSP7000, RSP1, and RSP2). You *must* reformat the Flash memory used on one of these systems *before* you can use it as a boot or storage source with the RSP4.

Caution   To prevent system problems, use Flash memory cards in the RSP4 that were formatted on an RSP4, or an RSP1, RSP2, or RSP7000 running Cisco IOS Release 11.1(8) or a later release of 11.1 CA. Formatting a Flash memory card will cause existing data to be lost.

Step 2   Enable the router by copying the image *new.image* to the Flash memory card, making this image in the Flash memory card (in slot 0) the default boot image, and rebooting the router, using the following series of commands:

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

In the preceding example, the exclamation points (!!!) appear as the file is downloaded, and the "C" characters signify calculation of the cyclic redundancy check (CRC) value, which is a verification that the file has been correctly downloaded to the Flash memory card.

This completes the procedure for copying a bootable image into a Flash memory card.

Copying Bootable Images Between Flash Memory Cards

As future releases of Cisco IOS images become available, you will receive these images either as a file booted from a network server, a file on a floppy disk, or a file on a Flash memory card.

The following scenario describes how to use a newly released image on a Flash memory card in a system that has an older image on a Flash memory card in slot 0 and a default boot image in the onboard Flash memory.

For this scenario, the filenames are as follows:

- The new image on the new Flash memory card is *image.new.*
- The old image in the Flash memory card in slot 0 is *image.old*.

- The bootable image in onboard Flash memory is *image.boot*.

You will copy the new image from the new Flash memory card onto the Flash memory card that contains the old image.

Note   The scenario assumes that the new image will fit on the Flash memory card in slot 0, alongside the old image. If there is not enough available space, use the **delete** command to delete files from the Flash memory card to make sufficient room for the new image; however, *do not* delete the *image.old* file. Then use the **squeeze** command to remove these deleted files from the Flash memory card. If after you have deleted files and used the **squeeze** command, the two files cannot coexist on the Flash memory card in slot 0, remove this card (place it in an antistatic bag and store it in a safe place), and then insert the new Flash memory card (with the file *image.new*) in slot 0. Proceed to Step 5 and use the command **boot system flash slot0:image.new** to designate the file *image.new* as the default boot image.

Following is the procedure for copying bootable images between Flash memory cards:

Step 1   Boot the router. By default, the file *image.boot* will be used.

Step 2   Enable the router as follows:

```
Router> en
Password:
Router#
```

Step 3   Insert the new Flash memory card in slot 1.

Step 4   Use the following command to copy the file *image.new* in slot 1 to the Flash memory card in slot 0, only *if* there is enough memory space for the two images to coexist. If there is *not* enough memory space, proceed to Step 5.

```
Router# copy slot1:image.new slot0:image.new
```

The previous command can also be entered as **copy slot1:image.new slot0:**.

Step 5   Use the following series of commands to designate the file *image.new* (in the Flash memory card in slot 0) as the default boot image:

```
Router# config t
Router(config)# no boot system
Router(config)# boot system flash slot0:image.new
Crtl-Z
Router# copy running-config startup-config
Router# reload
```

When the system reloads, it will boot the file *image.new* from the Flash memory card in slot 0.

This completes the procedure for copying bootable images between Flash memory cards.

Copying Files Between RSP Memory and a Flash Memory Card

Copying a configuration file to a Flash memory card in PC Card slot 0 or slot 1 might be required if you do not have access to a TFTP server on which you can temporarily store your configuration file. You can then copy the configuration file back to NVRAM at any time. Use the procedures in the following sections to first copy the configuration file from NVRAM or DRAM to a Flash memory card, and then to copy the configuration from the Flash memory card back to NVRAM.

Copying a Configuration File from RSP NVRAM to a Flash Memory Card on the RSP

You can use the command **copy startup-config** [**slot0:** | **slot1:**]:*filename* for the copy procedure, in which **startup-config** is the file source (NVRAM) and [**slot0:** | **slot1:**]:*filename* is the file's destination in either of the Flash memory cards; note that the environmental variable CONFIG_FILE must be pointing (set) to NVRAM, which is the system default.

Following is the procedure for copying a configuration file from RSP NVRAM to a Flash memory card on the RSP:

Step 1 Use the **show boot** command to display the current setting for the environmental variable CONFIG_FILE as follows:

```
Router# show boot

(additional display text omitted)

CONFIG_FILE variable =
Current CONFIG_FILE variable =

(additional display text omitted)
```

The preceding example shows that the environmental variable CONFIG_FILE is set for NVRAM, by default.

Step 2 Use the **copy startup-config slot0:***filename* command as follows:

```
Router# copy startup-config slot0:myfile2
20575008 bytes available on device slot0, proceed? [confirm]
Address or name of remote host [1.1.1.1]?
Loading new.image from 1.1.1.1 (via Ethernet1/0): !!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 7799951/15599616 bytes] CCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Router#
```

✎

Note   In the preceding example, the exclamation points (!!!) appear as the file is copied. The "C" characters signify calculation of the checksum—a verification that the file has been correctly copied.

Step 3 To verify the file was copied correctly, use the **dir** command as follows:

```
Router# dir slot0:
-#- -length- -----date/time------ name
1   5200084  Jul 11 1996 19:24:12 rsp-jv-mz.111-4
3   1215     Jul 11 1996 20:30:52 myfile1
```

```
4    6176844   Jul 11 1996 23:04:10 rsp-jv-mz.111-472
5    1186      Jul 12 1996 16:56:50 myfile2

9197156 bytes available (11381148 bytes used)
Router#
```

This completes the procedure for copying files between RSP NVRAM and a Flash memory card.

Copying a Configuration from RSP DRAM to a Flash Memory Card on the RSP

You can use the command **copy running-config** [**slot0:** | **slot1**:]:*filename* for the copy procedure where **running-config** is the file's source (the temporary configuration in DRAM) and [**slot0:** | **slot1:**]:*filename* is the file's destination in either of the Flashmemory cards.

An example of the **copy startup-config slot0:***filename* command follows:

```
Router# copy running-config slot0:myfile2
20575008 bytes available on device slot0, proceed? [confirm]
Address or name of remote host [1.1.1.1]?
Loading new.image from 1.1.1.1 (via Ethernet1/0): !!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!![OK - 7799951/15599616 bytes] CCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Router#
```

✎
Note   In the preceding example, the exclamation points (!!!) appear as the file is copied. The "C" characters signify calculation of the checksum—a verification that the file has been correctly copied.

To verify the file was copied correctly, use the **dir** command as follows:

```
Router# dir slot0:
-#- -length- -----date/time------ name
1   5200084   Jul 11 1996 19:24:12 rsp-jv-mz.111-4
3   1215      Jul 11 1996 20:30:52 myfile1
4   6176844   Jul 11 1996 23:04:10 rsp-jv-mz.111-472
5   1186      Jul 12 1996 16:56:50 myfile2

9197156 bytes available (11381148 bytes used)
```

This completes the procedure for copying a configuration file from RSP DRAM to a Flash memory card.

Copying a Configuration File from a Flash Memory Card to RSP NVRAM

This section describes the procedure for copying your configuration file from the Flash memory card in PC Card slot 0 or slot 1 back to NVRAM.

Use the **copy** [**slot0:** | **slot1:**]:*filename* **startup-config** command for this copy procedure, in which [**slot0:** | **slot1:**]:*filename* is the source of the file (Flash memory card), and **startup-config** is the destination (NVRAM).

An example of the **copy slot0:***filename* **startup-config** command follows:

```
Router# copy slot0:myfile startup-config
[ok]
Router#
```

To ensure that the startup configuration file, now stored in NVRAM, is the default running configuration file used by the system, issue the **copy startup-config running-config** command as follows:

```
Router# copy startup-config running-config
Router#
%SYS-5-CONFIG_I: Configured from memory by console
Router#
```

This completes the procedure for copying a configuration file from the Flash memory card to NVRAM.

Recovering from Locked Blocks in Flash Memory Cards

A locked block in Flash memory cards occurs when power is lost or a Flash memory card is unplugged during a write or erase operation. When a block of Flash memory is locked, it cannot be written to or erased, and the operation will consistently fail at a particular block location. The only way to recover from locked blocks is by reformatting the Flash memory card with the **format** command.

⚠

Caution   Formatting a Flash memory card will cause existing data to be lost.

If You Need More Configuration Information

The Cisco IOS software running your Cisco 7500 series router contains extensive features and functionality. The effective use of many of these features is easier if you have more information at hand.

For additional information on Cisco IOS software and configuring your router, refer to the following documentation resources:

- Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more up to date than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription. You can also access Cisco documentation on the World Wide Web at http://www.cisco.com, http://www-china.cisco.com, or http://www-europe.cisco.com.

- For systems with Cisco IOS Release 10.0 (1) or a later release of 10.0, refer to the following publications:

    - *Router Products Configuration Guide*

    - *Router Products Command Reference*

    - *Configuration Builder Getting Started Guide*

    - *Troubleshooting Internetworking Systems*

    - *Debug Command Reference*

    - *System Error Messages*

    - *Cisco IOS Software Command Summary*

    - *Cisco Management Information Base (MIB) User Quick Reference*

- For systems with Cisco IOS Release 11.2(1) or a later release of 11.2, refer to the following modular configuration and modular command reference publications, as appropriate for your configuration:

  - *Configuration Fundamentals Configuration Guide*

  - *Configuration Fundamentals Command Reference*

  - *Security Configuration Guide*

  - *Security Command Reference*

  - *Wide-Area Networking Configuration Guide*

  - *Wide-Area Networking Command Reference*

  - *Network Protocols Configuration Guide*, Parts 1, 2, and 3

  - *Network Protocols Command Reference*, Parts 1, 2, and 3

  - *Bridging and IBM Networking Configuration Guide*

  - *Bridging and IBM Networking Command Reference*

  - *Configuration Builder Getting Started Guide*

  - *Troubleshooting Internetworking Systems*

  - *Debug Command Reference*

  - *System Error Messages*

  - *Cisco IOS Software Command Summary*

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