CHAPTER 3

System Image, Microcode Image, and Configuration File Load Commands

This chapter provides detailed descriptions of the commands used to load and copy system images, microcode images, and configuration files. Microcode images contain microcode to be downloaded to various hardware devices. System images contain the system software. Configuration files contain commands entered to customize the function of the router.

For router configuration information and examples, refer to the "Foading System Images, Microcode Images, and Configuration Files" of the *Router Products Configuration Guide*.

b

To manually boot the router , use the **b** ROM monitor command.

b
b *filename* [*address*]
b flash [*filename*]

Syntax Description

filename	Name of the system image from which you want to netboot.
address	(Optional.) IP address of the TFTP server on which the system image resides. If omitted, this value defaults to the IP broadcast address of 255.255.255.255.
flash *filename*	(Optional.) Boots the router from Flash memory with the optional filename of the image you want loaded. The filename is case sensitive. Without a filename, the first valid file in Flash memory will be loaded.

Default

If you enter the **b** command and press Return, the router boots from ROM by default.

If you enter the **b flash** command without a *filename*, the first valid file in Flash memory is loaded.

Command Mode

ROM monitor (>)

Usage Guidelines

Use this command only when your router cannot find the configuration information needed in NVRAM. To get to the ROM monitor prompt, enter the **reload** EXEC command, and then press the Break key during the first 60 seconds of startup.

Refer to the *Cisco 7000 Hardware Installation and Maintenance* publication for the correct jumper setting.

Examples

In the following example, the router is manually booted from ROM:

```
> b
F3:
(ROM Monitor copyrights)
```

In the following example, the file routertest is netbooted from IP address 131.108.15.112:

```
> b routertest 131.108.15.112
F3:
(ROM Monitor copyrights)
```

The following example shows the **b flash** command without the *filename* argument.The first valid file in Flash memory is loaded.

```
>b flash
F3: 1858656+45204+166896 at 0x1000

Booting gs7-k from flash memory RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR [OK - 1903912/13765276 bytes]
F3: 1858676+45204+166896 at 0x1000

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subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
```

In the following example, the **b flash** command is used with the filename gs7-k. That is the file that will be loaded.

```
> b flash gs7-k
F3: 1858656+45204+166896 at 0x1000

Booting gs7-k from flash memory RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRR [OK - 1903912/13765276 bytes]
F3: 1858676+45204+166896 at 0x1000

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subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
System Bootstrap, Version 4.6(1012) [mlw 99], INTERIM SOFTWARE
Copyright (c) 1986-1992 by cisco Systems
RP1 processor with 16384 Kbytes of memory
```

boot bootstrap

To configure the file name that is used to boot a secondary bootstrap image, use the **boot bootstrap** global configuration command. Use the **no boot bootstrap** command to disable booting from a secondary bootstrap image.

boot bootstrap flash [*filename*]
no boot bootstrap flash [*filename*]

boot bootstrap mop *filename* [*mac-address*] [*interface*]
no boot bootstrap mop *filename* [*mac-address*] [*interface*]

boot bootstrap [**tftp**] *filename* [*address*]
no boot bootstrap [**tftp**] *filename* [*address*]

Syntax Description

flash	Indicates that the router will be booted from Flash memory.
mop	Indicates that the router will be netbooted from a system image stored on a DEC MOP server.
tftp	(Optional.) Indicates that the router will be netbooted from a system image stored on a TFTP server.
filename	(Optional with **flash**.) Name of the system image from which you want to netboot. If you omit the filename when booting from Flash, the router uses the first system image stored in Flash memory.
address	(Optional.) IP address of the TFTP server on which the system image resides. If omitted, this value defaults to the IP broadcast address of 255.255.255.255.
mac-address	(Optional.) MAC address of the MOP server on which the file resides. If the MAC address argument is not included, a broadcast message is sent to all MOP boot servers. The first MOP server to indicate that it has the file will be the server from which the router gets the boot image.
interface	(Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are **async**, **dialer**, **Ethernet**, **loopback**, **null**, **serial**, and **tunnel**. If the interface argument is not specified, a request will be sent on all interfaces that have MOP enabled, and the interface from which the first response is received will be used to load the software.

Default

The default is to not use a secondary bootstrap.

Command Mode

Global configuration

Usage Guidelines

The **boot bootstrap** command, in conjunction with setting bit 9 on the configuration register of an AGS, CGS, or MGS router, causes the router to load a secondary bootstrap image over the network. The secondary bootstrap image then loads the specified system image file. The name of the secondary bootstrap file is boot-csc3 or boot-csc4, depending on the router model. See the appropriate hardware installation guide for details on the configuration register and secondary bootstrap filename.

Use this command when you have attempted to load a system image but have run out of memory even after compressing the system image. Secondary bootstrap allows you to load a larger system image through a smaller secondary image.

Example

In the following example, the system image file sysimage-2 will be loaded by using a secondary bootstrap image:

```
boot bootstrap sysimage-2
```

boot buffersize

To modify the buffer size used to load configuration files, use the **boot buffersize** global configuration command. Use the **no boot buffersize** command to return to the default setting.

boot buffersize *bytes*
no boot buffersize

Syntax Description

bytes	Specifies the size of the buffer to be used. There is no minimum or maximum size that can be specified.

Default

The size of the nonvolatile memory.

Command Mode

Global configuration

Usage Guidelines

Normally, the router uses a buffer the size of the system nonvolatile memory to hold configuration commands read from the network. You can increase this size if you have a very complex configuration.

Example

The following example sets the buffer size to 64000:

```
configure terminal
boot buffersize 64000
```

boot host

To change the default name of the host configuration filename from which you want to load configuration commands, use the **boot host** global configuration command. Use the **no boot host** command to restore the host configuration filename to the default.

boot host mop *filename* [*mac-address*] [*interface*]
no boot host mop *filename* [*mac-address*] [*interface*]

boot host [**tftp**] *filename* [*address*]
no boot host [**tftp**] *filename* [*address*]

Syntax Description

mop	Indicates that the router will be configured from a configuration file stored on a DEC MOP server.
tftp	(Optional.) Indicates that the router will be configured from a configuration file stored on a TFTP server.
filename	Name of the file from which you want to load configuration commands.
address	(Optional.) IP address of the TFTP server on which the file resides. If omitted, this value defaults to the IP broadcast address of 255.255.255.255.
mac-address	(Optional.) MAC address of the MOP server on which the file resides. If the MAC address argument is not included, a broadcast message is sent to all MOP boot servers. The first MOP server to indicate that it has the file will be the server from which the router gets the boot image.
interface	(Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are **async**, **dialer**, **ethernet**, **serial**, and **tunnel**. If the interface argument is not specified, a request will be sent on all interfaces that have MOP enabled, and the interface from which the first response is received will be used to load the software.

Default

By default, the router uses its host name to form a host configuration filename. To form this name, the router converts its name to all lowercase letters, removes all domain information, and appends *-confg*.

Command Mode

Global configuration

Usage Guidelines

Use the **service config** command to enable the loading of the specified configuration file at reboot time. Without this command, the router ignores the **boot host** command and uses the configuration information in NVRAM. If the configuration information in NVRAM is invalid or missing, the **service config** command is enabled automatically.

The network server will attempt to load two configuration files from remote hosts. The first is the network configuration file containing commands that apply to all network servers on a network. The second is the host configuration file containing commands that apply to one network server in particular.

Example

The following example sets the host filename to wilma-confg at address 192.31.7.19:

```
boot host /usr/local/tftpdir/wilma-confg 192.31.7.19
```

Related Commands

boot network
service config

boot network

To change the default name of the network configuration file from which you want to load configuration commands, use the **boot network** global configuration command. Use the **no boot network** command to restore the network configuration filename to the default.

boot network mop *filename* [*mac-address*] [*interface*]
no boot network mop *filename* [*mac-address*] [*interface*]

boot network [**tftp**] *filename* [*address*]
no boot network [**tftp**] *filename* [*address*]

Syntax Description

mop	Indicates that the router will be configured from a configuration file stored on a DEC MOP server.
tftp	(Optional.) Indicates that the router will be configured from a configuration file stored on a TFTP server.
filename	Name of the file from which you want to load configuration commands.
address	(Optional.) IP address of the TFTP server on which the compressed image file resides. If omitted, this value defaults to the ip broadcast address of 255.255.255.255.
mac-address	(Optional.) MAC address of the MOP server on which the file resides. If the MAC address argument is not included, a broadcast message is sent to all MOP boot servers. The first MOP server to indicate that it has the file will be the server from which the router gets the boot image.
interface	(Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are **async**, **dialer**, **Ethernet**, **serial**, and **tunnel**. If the interface argument is not specified, a request will be sent on all interfaces that have MOP enabled, and the interface from which the first response is received will be used to load the software.

Default

The default filename is network-config.

Command Mode

Global configuration

Usage Guidelines

When netbooting, routers ignore routing information, static IP routes, and bridging information. As a result, intermediate routers are responsible for handling TFTP requests correctly. Before netbooting, verify that a server is available by using the **ping** command.

Use the **service config** command to enable the loading of the specified configuration file at reboot time. Without this command, the router ignores the **boot network** command and uses the configuration information in NVRAM. If the configuration information in NVRAM is invalid or missing, the **service config** command is enabled automatically.

The network server will attempt to load two configuration files from remote hosts. The first is the network configuration file containing commands that apply to all network servers on a network. The second is the host configuration file containing commands that apply to one network server in particular.

Example

The following example changes the network configuration filename to bridge_9.1 and uses the default broadcast address:

```
boot network bridge_9.1
service config
```

Related Commands

boot host
service config

boot system

To change the filename of the system image that is loaded onto the router at reboot time, use the **boot system** global configuration command. Use the **no boot system** command to remove the name.

boot system flash [*filename*]
no boot system flash [*filename*]

boot system mop *filename* [*mac-address*] [*interface*]
no boot system mop *filename* [*mac-address*] [*interface*]

boot system rom
no boot system rom

boot system [**tftp**] *filename* [*address*]
no boot system [**tftp**] *filename* [*address*]

no boot system

Syntax Description

flash	Indicates that the router will be booted from Flash memory.
mop	Indicates that the router will be netbooted from a system image stored on a DEC MOP server.
rom	Indicates the router will be booted from ROM.
tftp	(Optional.) Indicates that the router will be netbooted from a system image stored on a TFTP server.
filename	(Optional with **flash**.) Name of the configuration file from which you want to netboot. It is case sensitive.
address	(Optional.) IP address of the TFTP server on which the image file resides. If omitted, this value defaults to the IP broadcast address of 255.255.255.255.
mac-address	(Optional.) MAC address of the MOP server on which the file resides. If the MAC address argument is not included, a broadcast message is sent to all MOP boot servers. The first MOP server to indicate that it has the file will be the server from which the router gets the boot image.
interface	(Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are **async**, **dialer**, **ethernet**, **serial**, and **tunnel**. If the interface argument is not specified, a request will be sent on all interfaces that have MOP enabled, and the interface from which the first response is received will be used to load the software.

Default

If you do not specify a system image file with the **boot system** command, the router uses the configuration register settings to determine the default system image filename for netbooting. The router forms the default boot filename by starting with the word *cisco* and then appending the octal

equivalent of the boot field number in the configuration register, followed by a hyphen, and the processor type name (cisco*nn-cpu*). See the appropriate hardware installation guide for details on the configuration register and default filename. See also the command **config-register**.

Command Mode

Global configuration

Usage Guidelines

In order for this command to work, the **config-register** command must be set properly.

Enter several **boot system** commands to provide a fail-safe method for booting your router. Use the **boot system rom** command to specify use of the ROM system image as a backup to other **boot** commands in the configuration. You can enter the different types of **boot system** commands in any order. The router attempts to load from Flash memory first, then from a TFTP or MOP server, and finally from ROM. If you enter multiple boot commands of the same type—for example, if you enter two commands that instruct the router to boot from different network servers—then the router tries them in the order they are entered.

Each time you write a new software image to Flash memory, you must delete the existing filename in the configuration file with the **no boot system flash** *filename* command. Then add a new line in the configuration file with the **boot system flash** *filename* command.

Note The **no boot system** global configuration command disables all **boot system** configuration commands regardless of argument. Specifying the **flash** keyword or the *filename* argument with the **no boot system** command disables only the command specified by these arguments.

You can netboot from a compressed image. When a server netboots software, the image being booted and the running image must both fit into memory. Use compressed images to ensure that there is enough available memory to boot the router. You can produce a compressed software image on any UNIX platform using the compress program. Refer to your UNIX platform's documentation for the exact usage of the compress program.

Example

The following example illustrates a list specifying two possible Internetwork locations for a system image, with the ROM software being used as a backup:

```
boot system cs3-rx.90-1 192.31.7.24
boot system cs3-rx.83-2 192.31.7.19
boot system rom
```

Related Commands

config-register
copy flash tftp
copy tftp flash

configure

To enter global configuration mode, use the **configure** privileged EXEC command. You must be in global configuration mode to enter global configuration commands.

configure {**terminal** | **memory** | **network**}

Syntax Description

terminal Executes configuration commands from the terminal.

memory Executes the configuration commands stored in NVRAM.

network Retrieves the configuration commands stored in a file on a server.

Default

None

Command Mode

Privileged EXEC

Usage Guidelines

If you do not specify **terminal**, **memory**, or **network**, the router prompts you for the source of configuration commands. After you enter the **configure** command, the system prompt changes from `<router-name>#` to `<router-name>(config)#`, indicating that you are in global configuration mode. To leave global configuration mode and return to the privileged EXEC prompt, press Ctrl-Z.

Examples

In the following example, the router is configured from the terminal:

```
Router# configure

Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
```

In the following example, the router is configured from the file tokyo-confg at IP address 131.108.2.155:

```
Router1# configure network

Host or network configuration file [host]?
IP address of remote host [255.255.255.255]? 131.108.2.155
Name of configuration file [tokyo-confg]?
Configure using tokyo-confg from 131.108.2.155? [confirm] y
Booting tokyo-confg from 131.108.2.155:!! [OK - 874/16000 bytes]
```

Related Commands

show configuration
write memory
write terminal

config-register

To change the router configuration register settings, use the **config-register** global configuration command.

config-register *value*

Syntax Description

value Hexadecimal or decimal value that represents the 16-bit configuration register value you want to use the next time the router is restarted. The value range is from 0x0 to 0xFFFF (0 to 65535 in decimal).

Default

For the router models without Flash memory, the default is 0x101, which causes the router to boot from ROM and the Break key to be ignored. For router models with Flash memory, the default is 0x10F, which causes the router to boot from Flash memory and the Break key to be ignored.

Command Mode

Global configuration

Usage Guidelines

This command applies only to the Cisco 2000, Cisco 3000, Cisco 4000, or IGS (the IGS must be running Software Release 9.1 or later). All other models use a hardware configuration register.

The lowest four bits of the configuration register (bits 3, 2, 1, and 0) form the boot field. The boot field determines if the router boots manually, from ROM, or from Flash or the network. Bit 8 controls the console Break key; when set to 1, it causes the Break key to be ignored. The remaining bits control other features of the router and are typically set to 0.

To change the boot field value and leave all other bits set to their default values, follow these guidelines:

- If you set the configuration register value to 0x100, you must boot the operating system manually with the **b** command.
- If you set the configuration register value to 0x101, the router boots using the default ROM software.
- If you set the configuration register to any value from 0x102 to 0x10F, the router uses the boot field value to form a default boot filename for netbooting.

For more information about the configuration register bit settings and default filenames, see the appropriate router hardware installation guide.

Example

In the following example, the configuration register is set to boot the system image from Flash memory:

```
config-register 0x010F
```

Related Commands

boot system
o
show version

copy flash tftp

To copy a system image from Flash memory to a TFTP server, use the **copy flash tftp** EXEC command.

copy flash tftp

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The copy of the system image can serve as a backup copy and also can be used to verify that the copy in Flash is the same as on the original file on disk.

Example

The following example illustrates how to use this command:

```
Router# copy flash tftp
IP address of remote host [255.255.255.255]? 101.2.13.110
Name of file to copy? gsxx
writing gsxx !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!copy complete
Router#
```

Related Commands

boot system flash
copy tftp flash

copy tftp flash

To copy a system image using TFTP into Flash memory, use the **copy tftp flash** EXEC command.

copy tftp flash

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The router prompts for the address of the TFTP server and TFTP filename. It provides an option to erase existing Flash memory before writing onto it. The entire copying process takes several minutes and will differ from network to network.

Before booting from Flash memory, verify that the checksum of the image in Flash memory matches the checksum listed in the README file that was distributed with the system software image. The checksum of the image in Flash memory is displayed at the bottom of the screen when you issue the **copy tftp flash** command. The README file was copied to the TFTP server automatically when you installed the system software image.

Caution If the checksum value is not correct according to the value in the README file, do not reboot the router. Issue the **copy tftp flash** command and compare the checksums again. If the checksum is repeatedly wrong, copy the original system software image back into Flash memory *before* you reboot the router from Flash memory. If you have a bad image in Flash memory and try to boot from Flash, the router will start the system image contained in ROM (assuming netbooting is not configured). If ROM does not contain a fully functional system image, the router will not function and will have to be reconfigured through a direct console port connection.

Example

The following example shows sample output of copying a system image named IJ09140Z into Flash memory:

```
Router# copy tftp flash
IP address or name of remote host [255.255.255.255]? server1
Name of tftp filename to copy into flash []? IJ09140Z
copy IJ09140Z from 131.131.101.101 into flash memory? [confirm] <Return>
xxxxxxxx bytes available for writing without erasure.
erase flash before writing? [confirm] <Return>
Clearing and initializing flash memory (please wait)####...
Loading from 101.2.13.110: !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!... [OK - 324572/524212 bytes]
Verifying checksum...
VVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVV...
Flash verification successful. Length = 1204637, checksum = 0x95D9
```

The exclamation points (!) indicate the copy process. The series of V’s in the sample output indicates that a checksum verification of the image is occurring after the image is written to Flash.

Related Commands

boot system flash
copy flash tftp
copy verify

copy verify

To verify the checksum of a system image in Flash memory, use the **copy verify** EXEC command.

copy verify

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The **copy verify** command works on IGS/TR, Cisco 3000, Cisco 4000, and Cisco 7000 routers only.

Each system software or microcode image that is distributed on disk uses a single checksum for the entire image. This checksum is displayed only when the image is copied into Flash memory; it is *not* displayed when the image file is copied from one disk to another.

The README file (which is included with the image on the disk) lists the name, file size, and checksum of the image. Review the contents of the README file before loading or duplicating the new image so that you can verify the checksum when you copy it into the Flash memory or onto a TFTP server.

To display the contents of Flash memory, use the **show flash** or **show flash all** command. The Flash content listing does not include the checksum of individual files. To recompute and verify the image checksum after the image is copied into Flash memory, use the **copy verify** command. When you enter the command, the screen prompts you for the filename to verify. By default, it prompts for the last file in Flash (most recent). Press Return to recompute the default file checksum or enter the filename of a different file at the prompt.

Example

The following example illustrates how to use this command:

```
Router# copy verify

Name of file to verify [gsxx]?
Verifying via checksum...
vvvvvvvvvvvvvvvvvvvvvvvvvvvvv

Flash verification successful. Length = 1923712, checksum = 0xA0C1
Router#
```

Related Command

copy tftp flash

ip rarp-server

Use the **ip rarp-server** interface configuration command to allow the router to act as a Reverse Address Resolution Protocol (RARP) server. Use the **no ip rarp-server** command to restore the interface to the default of no RARP server support.

ip rarp-server *address*
no ip rarp-server *address*

Syntax Description

address	IP address which is to be provided in the source protocol address field of the RARP response packet. Normally, this is set to whatever address you configure as the primary address for the interface.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This feature makes diskless booting of clients possible between network subnets where the client and server are on separate subnets.

RARP server support is configurable on a per interface basis, so that the router does not interfere with RARP traffic on subnets that do not need RARP assistance from the router.

The router answers incoming RARP requests only if both of the following two conditions are met:

- The **ip rarp-server** command has been configured for the interface on which the request was received.
- There is a static entry found in the IP ARP table that maps the MAC address contained in the RARP request to an IP address.

Use the **show ip arp** EXEC command to display the contents of the IP ARP cache.

Sun makes use of RARP and UDP-based network services to facilitate network-based booting of SunOS on their workstations. By bridging RARP packets and using both the **ip helper-address** interface configuration command and the **ip forward-protocol** global configuration command, the router should be able to perform the necessary packet switching to enable booting of Sun workstations across subnets. Unfortunately, some Sun workstations assume that the sender of the RARP response, in this case the router, is the host the client can contact to TFTP load the bootstrap image. This causes the workstations to fail to boot.

By using the **ip rarp-server** feature, the router can be configured to answer these RARP requests, and the client machine should be able to reach its server by having its TFTP requests forwarded through the router that acts as the RARP server.

In the case of RARP responses to Sun workstations attempting to diskless boot, the IP address specified in the **ip rarp-server** interface configuration command should be the IP address of the TFTP server. In addition to configuring RARP service, the router must also be configured to forward UDP-based Sun portmapper requests to completely support diskless booting of Sun workstations. This can be accomplished using configuration commands of the form:

```
ip forward-protocol udp 111
interface <interface name>
ip helper-address <broadcast-address>
```

RFC 903 documents the Reverse Address Resolution Protocol.

Examples

The following partial example configures the router to act as a RARP server. The router is configured to use the primary address of the specified interface in its RARP responses.

```
arp 128.105.2.5 0800.2002.ff5b arpa
interface ethernet 0
ip address 128.105.3.100 255.255.255.0
ip rarp-server 128.105.3.100
```

In the following example, the router is configured to act as a RARP server, with TFTP and portmapper requests forwarded to the Sun server:

```
! Allow the router to forward broadcast portmapper requests
ip forward-protocol udp 111
! Provide the router with the IP address of the diskless sun
arp 128.105.2.5 0800.2002.ff5b arpa
interface ethernet 0
! Configure the router to act as a RARP server, using the Sun Server's IP
! address in the RARP response packet.
ip rarp-server 128.105.3.100
! Portmapper broadcasts from this interface are sent to the Sun Server.
ip helper-address 128.105.3.100
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

ip forward-protocol †
ip helper-address †

microcode

To specify the location of the microcode you want to download from Flash memory into the writable control store (WCS) on a Cisco 7000, use the **microcode** interface configuration command.

microcode *interface-type* [**flash** | **rom**] [*filename*]
no microcode *interface-type* [**flash** | **rom**] [*filename*]

Syntax Description

interface-type	One of the following interface processor names: **fip**, **trip**, **eip**, or **sp**.
flash	(Optional.) If the **flash** keyword is specified, a *filename* argument is required, unless you are using the **no microcode** *interface-type* **flash** command.
rom	(Optional.) If the **rom** keyword is specified, no further arguments are necessary. For example, the command **microcode fip rom** specifies that all FDDI Interface Processors (FIPs) should be loaded from their onboard ROM microcode.
filename	(Optional.) Filename of the microcode in Flash memory that you want to download. This argument is only used with the **flash** keyword. If you use the **flash** keyword, the name of the microcode file in Flash is required unless the command is **no microcode** *interface-type* **flash**. (This command results in the same default condition as the command **microcode** *interface-type* **rom**, which indicates that the card should be loaded from its onboard ROM microcode.)

Default

no microcode *interface-type* **flash**, which is the same as **microcode** *interface-type* **rom**

By default, microcode is loaded from the ROM on each interface card. (This onboard ROM microcode is not the same as the eight ROMs on the RP that contain the system image.)

Command Mode

Interface configuration

Examples

In the following example, all FIP cards will use their onboard ROM microcode:

```
microcode fip rom
```

In the following example, all FIP cards will be loaded with the microcode found in Flash memory file `fip.v141-7` when the system is booted, when a card is inserted or removed, or when the **microcode reload** interface configuration command is issued. The configuration is then written to NVRAM.

```
microcode fip flash fip.v141-7
^Z
> write memory
```

Related Command

microcode reload

microcode reload

To signal to the Cisco 7000 that all microcode configuration commands have been entered and the processor cards should be reloaded, use the **microcode reload** interface configuration command.

microcode reload

Syntax Description

This command has no arguments or keywords.

Command Mode

Interface configuration

Example

In the following example, all controllers are reset, the specified microcode is loaded, and the CxBus complex is reinitialized according to the microcode configuration commands that have been written to memory:

```
microcode reload
```

Related Command

microcode

mop device-code

To identify the type of device sending MOP sysid messages and request program messages, use the **mop device-code** global configuration command. Use the **no mop device-code** command to set the identity to the default value.

mop device-code {**cisco** | **ds200**}
no mop device-code {**cisco** | **ds200**}

Syntax Description

cisco	Denotes a Cisco device code.
ds200	Denotes a DEC server 200 device code.

Default

cisco

Command Mode

Global configuration

Usage Guidelines

The sysid messages and request program messages use the identity information indicated by this command.

Example

The following example identifies a DEC Server 200 device as sending MOP sysid and request program messages:

```
mop device-code ds200
```

Related Command

A dagger (†) indicates that the command is documented in another chapter.

mop sysid †

mop retransmit-timer

To configure the length of time the router waits before retransmitting boot requests to a MOP server, use the **mop retransmit-timer** global configuration command. Use the **no mop retransmit-timer** command to reinstate the default value.

mop retransmit-timer *seconds*
no mop retransmit-timer

Syntax Description

seconds	Sets the length of time, in seconds, that the router waits before retransmitting a message. The value is a number from 1 to 20.

Default

4 seconds

Command Mode

Global configuration

Usage Guidelines

By default, when the router transmits a request that requires a response from a MOP boot server and the server does not respond, the message will be retransmitted after 4 seconds. If the MOP boot server and router are separated by a slow serial link, it may take longer than 4 seconds for the router to receive a response to its message. Therefore, you might want to configure the router to wait longer than 4 seconds before retransmitting the message if you are using such a link.

Example

In the following example, if the MOP boot server does not respond within 10 seconds after the router sends a message, the server will retransmit the message:

```
mop retransmit-timer 10
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

mop device-code
mop retries
mop enabled †

mop retries

To configure the number of times a router will retransmit boot requests to a MOP server, use the **mop retries** global configuration command. Use the **no mop retries** command to reinstate the default value.

mop retries *count*
no mop retries

Syntax Description

count	Indicates the number of times a router will retransmit a MOP boot request. The value is a number from 3 to 24.

Default

8 times

Command Mode

Global configuration

Example

In the following example, the router will attempt to retransmit a message to an unresponsive host 11 times before declaring a failure:

```
mop retries 11
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

mop device-code
mop retransmit-timer
mop enabled †

o

To list the value of the boot field (bits 0-3) in the configuration register, use the ROM monitor **o** command. To reset the value of the boot field so that the router boots from ROM, use the ROM monitor **o/r** command.

o
o/r

Syntax Description

This command has no arguments or keywords.

Default

Refer to the appropriate hardware installation guide for default values.

Command Mode

ROM monitor

Usage Guidelines

To get to the ROM monitor prompt at a Cisco 2000, Cisco 3000, or Cisco 4000, use the **reload** EXEC command. Use the **i** command in conjunction with the **o/r** command to initialize the router. (The **i** command is documented in the *Hardware Installation and Maintenance* publication for your product.) The **o/r** command resets the configuration register to 0x141, which disables the Break key, ignores the NVRAM configuration, and boots the default system image from ROM.

Examples

The following is an example of the **o** command:

```
> o

Bit#    Configuration register option settings:
15      Diagnostic mode disabled
14      IP broadcasts do not have network numbers
13      Do not boot default ROM software if network boot fails
12-11   Console speed is 9600 baud
10      IP broadcasts with ones
09      Do not use secondary bootstrap
08      Break enabled
07      OEM disabled
06      Ignore configuration disabled
03-00   Boot to ROM monitor

>
```

The following is an example of the **o/r** and **i** commands used to reset and boot the default system image from ROM:

```
> o/r
> i
```

Related Command

config-register

reload

To reload the operating system, use the **reload** EXEC command.

reload

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The **reload** command halts the system. If the system is set to restart on error, it reboots itself. The **reload** command is used after configuration information is entered into a file and saved into NVRAM.

Example

The following example illustrates how to enter the **reload** command at the privileged EXEC prompt:

```
Router# reload
```

Related Command

write memory

service config

To enable autoloading of configuration files from a network server, use the **service config** global configuration command. Use the **no service config** command to restore the default.

service config
no service config

Syntax Description

This command has no arguments or keywords.

Default

Disabled, except on systems without NVRAM or with invalid or incomplete information in NVRAM. In these cases, autoloading of configuration files from a network server is enabled automatically.

Command Mode

Global configuration

Usage Guidelines

Usually, the **service config** command is used in conjunction with the **boot host** or **boot network** command. You must enter the **service config** command to enable the router to automatically configure the system from the file specified by the **boot host** or **boot network** command.

The **service config** command can also be used without the **boot host** or **boot network** command. If you do not specify host or network configuration filenames, the router uses the default configuration files. The default network configuration file is network-confg. The default host configuration file is <host>-confg, where <host> is the host name of the router. If the router cannot resolve its host name, the default host configuration file is router-confg.

Example

In the following example, the router is configured to autoload the default host configuration file:

```
boot host
service config
```

Related Commands

boot host
boot network

show configuration

Use the **show configuration** EXEC command to display the contents of the nonvolatile memory, if present and valid.

show configuration

The nonvolatile memory stores the configuration information in the network server in text form as configuration commands. The **show configuration** command shows the version number of the software used when you last executed the **write memory** command.

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the **show configuration** command:

```
Router# show configuration

Using 5057 out of 32768 bytes
!
enable-password xxxx
service pad
!
boot system dross-system 131.108.13.111
boot system dross-system 131.108.1.111
!
exception dump 131.108.13.111
!
no ip ipname-lookup
!
decnet routing 13.1
decnet node-type area
decnet max-address 1023
!
interface Ethernet 0
ip address 131.108.1.1 255.255.255.0
ip helper-address 131.120.1.0
ip accounting
ip gdp
decnet cost 3
!
ip domain-name CISCO.COM
ip name-server 255.255.255.255
!
end
```

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

configure
description †
write memory
write terminal

show flash

Use the **show flash** EXEC command to verify Flash memory. The **show flash** command displays the type of Flash memory present, any files that may currently exist in Flash memory, and the amounts of Flash memory used and remaining.

show flash [**all**]

Syntax Description

all	(Optional.) Shows complete information about Flash memory, including information about the individual ROM devices in Flash memory and the names and sizes of all system image files stored in Flash, including those that are invalidated.

Command Mode

EXEC

Sample Display

The following is sample output from the **show flash** command on the Cisco 3000 and 7000:

```
Router# show flash
4096K bytes of flash memory sized on embedded flash.

File     name/status
  0     ahp4/gs7-k
  1     micro/eip1-0
  2     micro/sp1-3
  3     micro/trip1-1
  4     micro/hip1-0
  5     micro/fip1-1
  6     fsipucode
  7     spucode
  8     tripucode
  9     fipucode
  10    eipucode
  11    hipucode
  12    sipucode
  13    sp_q160-1
  14    ahp4/sp160-3 [deleted]
  15    ahp4/sp160-3
[682680/4194304 bytes free/total]
```

Table 1-1 describes the **show flash** display fields for the Cisco 3000 and 7000.

Table 1-1 Show Flash Field Descriptions

Field	Description
File	Number of file in flash memory.
name/status	Files that currently exist in flash memory.
bytes free	Amount of flash memory remaining.
[deleted]	Flag indicating that another file exists with the same name or that process has been aborted.

As the display shows, the Flash memory can store and display multiple, independent software images for booting itself or for TFTP server software for other products. This feature is useful for storing default system software. These images can be stored in compressed format (but cannot be compressed by the router).

To eliminate any files from Flash (invalidated or otherwise) and free up all available memory space, the entire Flash memory must be erased; individual files cannot be erased from Flash memory.

The following is a sample output from the **show flash all** command on the Cisco 3000 and 7000. The format of the display is different on different router models. The format of your display might differ.

```
Router# show flash all
4096K bytes of flash memory sized on embedded flash.
   Chip    socket   code      bytes     name
     0       U63     89BD   0x040000   INTEL 28F020
     1       U62     89BD   0x040000   INTEL 28F020
     2       U61     89BD   0x040000   INTEL 28F020
     3       U60     89BD   0x040000   INTEL 28F020
     4       U48     89BD   0x040000   INTEL 28F020
     5       U47     89BD   0x040000   INTEL 28F020
     6       U46     89BD   0x040000   INTEL 28F020
     7       U45     89BD   0x040000   INTEL 28F020
     8       U30     89BD   0x040000   INTEL 28F020
     9       U29     89BD   0x040000   INTEL 28F020
    10       U28     89BD   0x040000   INTEL 28F020
    11       U27     89BD   0x040000   INTEL 28F020
    12       U17     89BD   0x040000   INTEL 28F020
    13       U16     89BD   0x040000   INTEL 28F020
    14       U15     89BD   0x040000   INTEL 28F020
    15       U14     89BD   0x040000   INTEL 28F020

Flash file directory:
File  name/status
        addr     length    fcksum  ccksum
 0  gs7-k
      0x12000080  2601100   0x4015 0x4015
 1  micro/eip1-0
      0x1227B14C  53364     0x0    0x0
 2  micro/sp1-3
      0x12288200  55418     0x0    0x0
 3  micro/trip1-1
      0x12295ABC  105806    0x0    0x0
 4  micro/hip1-0
      0x122AF84C  35528     0x0    0x0
 5  micro/fip1-1
      0x122B8354  97070     0x0    0x0
 6  fsipucode
      0x122CFEC4  6590      0x0    0x0
 7  spucode
      0x122D18C4  55418     0x0    0x0
 8  tripucode
      0x122DF180  105806    0x0    0x0
 9  fipucode
      0x122F8F10  97070     0x0    0x0
 10  eipucode
      0x12310A80  53330     0x60A1 0x60A1
 11  hipucode
      0x1231DB14  35528     0x0    0x0
 12  sipucode
      0x1232661C  54040     0x0    0x0
 13  sp_q160-1
      0x1233974  42912      0x0    0x0
```

```
 14  ahp4/sp160-3 [deleted]
      0x1233E154  55730   0x0 0x0
 15  ahp4/sp160-3
      0x1234BB48  55808   0x0 0x0
[682680/4194304 bytes free/total]
```

Table 1-2 describes the **show flash all** display fields for the Cisco 3000 and 7000.

Table 1-2 Show Flash All Field Descriptions

Field	Description
bytes of flash memory sized on embedded flash	Total amount of Flash memory present.
Chip	Identifies the ROM unit.
socket	Location of the ROM unit.
code	Vendor code identifying the vendor of the ROM unit.
bytes	Size of the ROM unit (in hex bytes).
name (in row beginning with Chip)	Vendor name and chip part number of the ROM unit.
security jumper, flash memory	Security jumper is/is not installed. Flash memory is programmable or read-only. If the security jumper is not installed, you will see the **show flash** display with a message indicating that the jumper is not installed.
File	Number of the system image file. If no filename is specified in the **boot system flash** command, the router boots the system image file with the lowest file number.
name/status	Filename and status of a system image file. The status [invalidated] appears when a file has been rewritten (recopied) into Flash memory. The first (now invalidated) copy of the file is still present within Flash memory, but it is rendered unusable in favor of the newest version. The [invalidated] status can also indicate an incomplete file that results from the user aborting the copy process, a network timeout, or a Flash memory overflow.
addr	Address of the file in Flash memory.
length	Size of the system image file (in bytes).
fcksum	Checksum recorded in Flash memory.
ccksum	Computer checksum.
[deleted]	Flag indicating that another file exists with the same name or that process has been aborted.
bytes free/total	Amount of Flash memory used/total amount of Flash memory.

In the following example, the security jumper is not installed and you cannot write to Flash memory until the security jumper is installed:

```
Everest> show flash all
4096K bytes of flash memory on embedded flash (in RP1).
  security jumper(12V) is not installed,
flash memory is read-only.

file     offset length   name
00xDCD0     1903892    gs7-k [deleted]
10x1DEA24   1903912    gs7-k
 [329908/4194304 bytes free]
```

show microcode

To show the microcode bundled into the system, use the **show microcode** EXEC command.

show microcode

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the **show microcode** command:

```
Router# show microcode

Microcode bundled in system

FSIP version 1.0
HIP version 1.0
EIP version 1.0
SP version 1.4
TRIP version 1.1
```

show version

Use the **show version** EXEC command to display the configuration of the system hardware, the software version, the names and sources of configuration files, and the boot images.

show version

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the **show version** command from a Cisco 7000:

```
Router# show version

GS Software (GS7), Version 9.17(03)
Copyright (c) 1986-1992 by cisco Systems, Inc.
Compiled Wed 21-Oct-92 22:49

System Bootstrap, Version 4.6(0.15)

Current date and time is Thu 10-22-1992 13:15:03
Boot date and time is Thu 10-22-1992 13:06:55
env-chassis uptime is 9 minutes
System restarted by power-on
System image file is "gs7-k", booted via tftp from 131.131.111.111

RP1 (68040) processor with 16384K bytes of memory.
X.25 software.
Bridging software.
1 Switch Processor.
1 EIP controller (6 Ethernet).
6 Ethernet/IEEE 802.3 interface.
128K bytes of non-volatile configuration memory.
4096K bytes of flash memory on embedded flash (in RP1).
Configuration register is 0x0
```

Table 1-3 describes significant fields shown in the display.

Table 1-3 Show Version Field Descriptions

Field	Description
GS Software, Version 9.17(03)	Always specify the complete version number when reporting a possible software problem. In the example output, the version number is 9.17, third release.
System Bootstrap, Version 4.3	Bootstrap version string.
Current date and time is Thu 10-22-1992 13:15:03 Boot date and time is Thu 10-22-1992 13:06:55 env-chassis uptime is 9 minutes	Current date and time, the date and time the system was last booted, and *uptime*, or the amount of time the system has been up and running.
System restarted by power-on	Also displayed is a log of how the system was last booted, both as a result of normal system startup and of system error. For example, information can be displayed to indicate a bus error that is generally the result of an attempt to access a nonexistent address, as follows: `System restarted by bus error at PC 0xC4CA, address 0x210C0C0`
System image file is "gs7-k", booted via tftp from 131.131.111.111	If the software was booted over the network, the Internet address of the boot host is shown. If the software was loaded from onboard ROM, this line reads "running default software." In addition, the names and sources of the host and network configuration files are shown.
RP1....	The remaining output shows the hardware configuration and any nonstandard software options. The configuration register contents are displayed in hexadecimal notation.

The output of the **show version** EXEC command can also provide certain messages, such as bus error messages. If such error messages appear, report the complete text of this message to your technical support specialist.

tftp-server system

To specify TFTP server operation for a router, use the **tftp-server system** global configuration command. To remove a previously defined filename, use the **no tftp-server system** command with the appropriate filename and, optionally, access list number.

tftp-server system *filename* [*ip-access-list*]
no tftp-server system *filename* [*ip-access-list*]

Syntax Description

filename	Name you give the router ROM file.
ip-access-list	(Optional.) IP access list number.

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

You can specify multiple filenames by repeating the **tftp-server system** command. The system sends a copy of the system image contained in ROM or one of the system images contained in Flash to any host that issues a TFTP read request with this filename.

The following algorithm is used when deciding whether to send the ROM or Flash image:

- If you omit *filename* from the **tftp-server system** command, the TFTP request is rejected.
- If the specified *filename* is not stored in Flash memory, the ROM image is sent.
- If the specified *filename* exists in Flash memory, a copy of the Flash image is sent.

Images that run from ROM, including IGS images, cannot be loaded over the network. Therefore, it does not make sense to use TFTP to offer the ROMs on these images.

Example

The following example causes the router to send, via TFTP, a copy of the ROM software when it receives a TFTP read request for the file version-9.0. The requesting host is checked against access list 22.

```
tftp-server system version-9.0 22
```

Related Command

A dagger (†) indicates that the command is documented in another chapter.

access-list †

write erase

To erase the configuration information in nonvolatile memory, use the **write erase** EXEC command.

write erase

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Example

The following example illustrates how to erase the configuration in nonvolatile memory:

```
Router# write erase
```

write memory

To copy the current configuration information to nonvolatile memory, use the **write memory** EXEC command.

write memory

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

Use the **write memory** command in conjunction with the **reload** command to restart the router with the configuration information stored in NVRAM.

If you issue the **write memory** command from a bootstrap system image, a warning displays that the previous NVRAM configuration will be overwritten and some of the configuration commands will be lost unless you answer no. This warning will not display if NVRAM does not contain a valid configuration or if the previous configuration in NVRAM was generated by a bootstrap system image.

Examples

The following example illustrates how to copy the current configuration information to nonvolatile memory:

```
Router# write memory
```

The following is an example of the warning the system provides if you are trying to save configuration information from bootstrap into the system:

```
router (boot)# write memory

Warning: Attempting to overwrite an NVRAM configuration written by a full system image.
This bootstrap software does not support a full configuration command set. If you write
memory now, some configuration commands may be lost.
Overwrite the previous NVRAM configuration? [confirm]
```

Enter **no** to escape writing the configuration information to memory.

Related Commands

configure
reload
show configuration

write network

To copy the current configuration information to a network server, use the **write network** EXEC command.

write network

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command copies the current configuration to a server host on the network. You are prompted for a destination host and filename.

Example

The following example illustrates how to begin the prompts for writing configuration information to a network host:

```
Router# write network
Remote host [0.0.0.0]? 131.108.1.111
Name of configuration file to write [Router-confg]?
Write file Router-confg on host 131.108.1.111? [confirm]
#
Writing Router-confg !! [OK]
Router#
```

write terminal

To display the current configuration information on the terminal, use the **write terminal** EXEC command.

write terminal

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

Use this command in conjunction with the **show configuration** command to compare the information in running memory to the information stored in NVRAM.

Example

The following example illustrates how to display the current configuration information:

```
Router# write terminal
```

Related Commands

configure
show configuration