

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 “Loading System Images, Microcode Images, and Configuration Files” chapter in the *Router Products Configuration Guide*.

async-bootp

Use the **async-bootp** global configuration command to enable support for extended BOOTP requests as defined in RFC 1084 when the router is configured for SLIP. Use the **no async-bootp** global configuration command to restore the default.

```
async-bootp tag [:hostname] data
no async-bootp
```

Syntax Description

<i>tag</i>	Item being requested; expressed as filename, integer, or IP dotted-decimal address. See Table 3-1 for possible values.
<i>:hostname</i>	(Optional) This entry applies only to the host specified. The argument <i>:hostname</i> accepts both an IP address and a logical host name.
<i>data</i>	List of IP addresses entered in dotted-decimal notation or as logical host names, a number, or a quoted string.

Table 3-1 Async-BOOTP Tag Keywords

Keyword	Description
bootfile	Specifies use of a server boot file from which to download the boot program. Use the optional <i>:hostname</i> and <i>data</i> arguments to specify the filename.
subnet-mask <i>mask</i>	Dotted-decimal address specifying the network and local subnetwork mask (as defined by RFC 950).
time-offset <i>offset</i>	Signed 32-bit integer specifying the time offset of the local subnetwork in seconds from Universal Coordinated Time (UTC).
gateway <i>address</i>	Dotted-decimal address specifying the IP addresses of gateways for this subnetwork. A preferred gateway should be listed first.
time-server <i>address</i>	Dotted-decimal address specifying the IP address of time servers (as defined by RFC 868).
IEN116-server <i>address</i>	Dotted-decimal address specifying the IP address of name servers (as defined by IEN 116).
DNS-server <i>address</i>	Dotted-decimal address specifying the IP address of Domain Name Servers (as defined by RFC 1034).
log-server <i>address</i>	Dotted-decimal address specifying the IP address of an MIT-LCS UDP log server.
quote-server <i>address</i>	Dotted-decimal address specifying the IP address of Quote of the Day servers (as defined in RFC 865).
lpr-server <i>address</i>	Dotted-decimal address specifying the IP address of Berkeley UNIX Version 4 BSD servers.
impress-server <i>address</i>	Dotted-decimal address specifying the IP address of Impress network image servers.

Keyword	Description
rlp-server <i>address</i>	Dotted-decimal address specifying the IP address of Resource Location Protocol (RLP) servers (as defined in RFC 887).
hostname <i>name</i>	The name of the client, which may or may not be domain qualified, depending upon the site.
bootfile-size <i>value</i>	A two-octet value specifying the number of 512-octet (byte) blocks in the default boot file.

Default

If no extended BOOTP commands are entered, the router software generates a gateway and subnet mask appropriate for the local network.

Command Mode

Global configuration

Usage Guidelines

Use the EXEC command **show async-bootp** to list the configured parameters. Use the **no async-bootp** command to clear the list.

Examples

The following example illustrates how to specify different boot files: one for a PC, and one for a Macintosh.

```
async-bootp bootfile :128.128.1.1 "pcboot"
async-bootp bootfile :mac "macboot"
```

With this configuration, a BOOTP request from the host on 128.128.1.1 results in a reply listing the boot filename as *pcboot*. A BOOTP request from the host named *mac* results in a reply listing the boot filename as *macboot*.

The following example specifies a subnet mask of 255.255.0.0.

```
async-bootp subnet-mask 255.255.0.0
```

The following example specifies a negative time offset of the local subnetwork of -3600 seconds.

```
async-bootp time-offset -3600
```

The following example specifies the IP address of a time server.

```
async-bootp time-server 128.128.1.1
```

Related Command

show async-bootp

b

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

```
b  
b filename [ip-address]  
b flash [filename]  
b flash [device:][partition-number:][filename]
```

Syntax Description

<i>filename</i>	Name of the system image from which you want to netboot. The filename is case sensitive.
<i>ip-address</i>	(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 <i>filename</i> , the first valid file in Flash memory is loaded.
<i>device:</i>	(Optional) Valid value is flash . This command syntax is available in IOS Release 10.0(6) and later.
[<i>partition-number:</i>]	(Optional) Boots the router from Flash memory with the optional filename of the image you want loaded from the specified Flash partition. Without <i>filename</i> , the first valid file in the specified partition of Flash memory is loaded. This command syntax is available in IOS Release 10.0(6) and later.
<i>filename</i>	(Optional) Boots the router from Flash memory with the filename of the image you want loaded from the specified Flash partition, if a partition is specified. If a partition is not specified, the system boots with the filename from the first partition. The filename is case sensitive. Without a filename, the first valid file in the specified partition of Flash memory is loaded. This command syntax is available in IOS Release 10.0(6) and later.

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.

For other defaults, see the Syntax Description section.

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.

In the following example, the **b flash flash** command boots the relocatable image file *igs-bpx-1* from partition 2 in Flash memory. Note that this output reflects the Dual Flash Bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000-M).

```
> b flash flash:2:igs-bpx-1
F3: 3562264+98228+303632 at 0x30000B4

(ROM Monitor copyrights)
```

boot bootstrap

To configure the filename 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 [ip-address]
no boot bootstrap [tftp] filename [ip-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.
<i>filename</i>	(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.
<i>ip-address</i>	(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.
<i>mac-address</i>	(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.
<i>interface</i>	(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

No 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

Buffer 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 [ip-address]
no boot host [tftp] filename [ip-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.
<i>filename</i>	Name of the file from which you want to load configuration commands.
<i>ip-address</i>	(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.
<i>mac-address</i>	(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.
<i>interface</i>	(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 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 *-config*.

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-config at address 192.31.7.19:

```
boot host /usr/local/tftpdire/wilma-config 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 [ip-address]  
no boot network [tftp] filename [ip-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.
<i>filename</i>	Name of the file from which you want to load configuration commands. The default filename is <i>network-config</i> .
<i>ip-address</i>	(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.
<i>mac-address</i>	(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.
<i>interface</i>	(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 [ip-address]  
no boot system [tftp] filename [ip-address]
```

```
no boot system  
boot system flash [device:][partition-number:][filename]
```

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 Digital MOP server.
rom	Indicates that 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.
<i>filename</i>	(Optional with flash .) Name of the configuration file from which you want to netboot. It is case sensitive.
<i>ip-address</i>	(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.
<i>mac-address</i>	(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.
<i>interface</i>	(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.

<i>device:</i>	(Optional) Valid value is flash . This command syntax is available in IOS Release 10.0(6) and later.
[<i>partition-number:</i>]	(Optional) Boots the router from Flash memory with the optional filename of the image you want loaded from the specified Flash partition. Without a <i>filename</i> , the first valid file in the specified partition of Flash memory is loaded. This command syntax is available in IOS Release 10.0(6) and later.
<i>filename</i>	(Optional) Boots the router from Flash memory with the filename of the image you want loaded from the specified Flash partition. The filename is case sensitive. Without a <i>filename</i> , the first valid file in the specified partition of Flash memory will be loaded. This command syntax is available in IOS Release 10.0(6) and later.

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 (*cisconn-cpu*). See the appropriate hardware installation guide for details on the configuration register and default filename. See also the command **config-register**. See also the Syntax Description section preceding this section.

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 command. Refer to your UNIX platform's documentation for the exact usage of the compress command. (You can also uncompress data with the UNIX uncompress command.)

The command syntax **boot system flash** [*device:*][*partition-number:*][*filename*] is available only in IOS Release 10.0(6) and later.

Examples

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
```

The following example uses the syntax **boot system flash** [*device:*][*partition-number:*][*filename*] to specify that the system boot relocatable image file *igs-bpx-1* from partition 2 of the Flash device. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
boot system flash flash:2:igs-bpx-1
```

Related Commands

- config-register**
- copy flash tftp**
- copy tftp flash**

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 to the Cisco 7000 series. 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

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.

Note The commands **configure net** “network” and **configure net** “host” commands no longer clear line parameters.

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-config 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-config]?
Configure using tokyo-config from 131.108.2.155? [confirm] y
Booting tokyo-config from 131.108.2.155:!! [OK - 874/16000 bytes]
```

Related Commands

show configuration

write memory

write terminal

Related Commands

boot system flash

copy tftp flash

copy mop flash

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

copy mop flash

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The **copy mop flash** command is available in IOS Release 10.0(6) or later.

The router prompts for the MOP 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 mop flash** command.



Caution If the checksum value is not correct according to the value in the README file, do not reboot the router. Issue the **copy mop 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 might not function and will have to be reconfigured through a direct console port connection.

Example

The following example shows sample output of when copying a system image into a partition of Flash. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
Router# copy mop flash
System flash partition information:
Partition  Size    Used    Free    Bank-Size    State    Copy-Mode
     1       4096K    2048K    2048K    2048K        Read Only  RXBOOT-FLH
     2       4096K    2048K    2048K    2048K        Read/Write Direct

[ Type ?<no> for partition directory; ? for full directory; q to abort]
Which partition? [default = 2]
```

The system will prompt only if there are two or more read/write partitions or one read-only and one read/write partition and dual Flash bank support in boot roms. If the partition entered is not valid, the process terminates. You have the option to enter a partition number, ? for directory display of all partitions, or ?*number* for directory display of a particular partition. The default is the first read/write partition.

If the partition is read-only and has dual Flash bank support in boot ROMs, the session continues as follows:

```
**** NOTICE ****
Flash load helper v1.0
This process will accept the copy options and then terminate
the current system image to use the ROM based image for the copy.
Routing functionality will not be available during that time.
If you are logged in via telnet, this connection will terminate.
Users with console access can see the results of the copy operation.
-----
Proceed? [confirm]
System flash directory, partition 1:
File Length Name/status
  1 3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Source file name? master/igs-bfpx-100.4.3
Destination file name [default = source name]?
```

The file will be copied into the partition given by the user earlier

```
Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from MOP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes
```

If the partition is read-write, the session continues as follows:

```
System flash directory, partition 2:
File Length Name/status
  1 3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Source file name? master/igs-bfpx.100-4.3
Destination file name [default = source name]?
```

The file will be copied into the partition given by the user earlier

```
Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from MOP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes
```

Related Commands

- boot system flash**
- copy flash tftp**
- copy verify**

The system will prompt only if there are two or more read/write partitions or one read-only and one read/write partition and dual Flash bank support in boot roms. If the partition entered is not valid, the process terminates. You have the option to enter a partition number, ? for directory display of all partitions, or ?*number* for directory display of a particular partition. The default is the first read/write partition.

If the partition is read-only and has dual Flash bank support in boot ROM, the session continues as follows:

```

                **** NOTICE ****

Flash load helper v1.0
This process will accept the copy options and then terminate
the current system image to use the ROM based image for the copy.
Routing functionality will not be available during that time.
If you are logged in via telnet, this connection will terminate.
Users with console access can see the results of the copy operation.
                ---- ***** ----

Proceed? [confirm]
System flash directory, partition 1:
File Length Name/status
  1  3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx-100.4.3
Destination file name [default = source name]?

```

The file will be copied into the partition given by the user earlier.

```

Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes

```

If the partition is read-write, the session continues as follows:

```

System flash directory, partition 2:
File Length Name/status
  1  3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx.100-4.3
Destination file name [default = source name]?

```

The file will be copied into the partition given by the user earlier.

```

Accessing file 'master/igs-bfpx.100-4.3' on ABC.CISCO.COM...
Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes

```

Related Commands

- boot system flash**
- copy flash tftp**
- copy verify**

erase flash

To erase Flash memory, use the **erase flash** EXEC command.

erase flash

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command is available in IOS Release 10.0(6) or later. It performs the same action as the **copy erase flash** command.

Example

The following example illustrates how to use this command. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
Router# erase flash
System flash partition information:
Partition  Size    Used    Free    Bank-Size  State    Copy-Mode
   1         4096K   2048K   2048K   2048K      Read Only  RXBOOT-FLH
   2         4096K   2048K   2048K   2048K      Read/Write  Direct

[ Type ?<no> for partition directory; ? for full directory; q to abort]
Which partition? [default = 2]
```

The system will prompt only if there are two or more read/write partitions. If the partition entered is not valid or is the read-only partition, the process terminates. You have the option to enter a partition number, **?** for directory display of all partitions, or **?number** for directory display of a particular partition. The default is the first read/write partition.

```
System flash directory, partition 2:
File Length Name/status
  1  3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]

Erase flash device, partition 2? [confirm] <Return>
```

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 ip-address  
no ip rarp-server ip-address
```

Syntax Description

ip-address IP address that 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 Microsystems, Inc. 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 <target-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 series, use the **microcode** interface configuration command.

```
microcode interface [flash | rom | system] [filename]  
no microcode interface [flash | rom] [filename]
```

Syntax Description

<i>interface</i>	One of the following interface processor names: aip , fip , fsip , hip , mip , trip , eip , or sp .
flash	(Optional) If the flash keyword is specified, a <i>filename</i> argument is required, unless you are using the no microcode interface 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. This onboard ROM microcode is not the same as the eight ROMs on the RP that contain the system image.
system	(Optional) If system is specified, the router loads the microcode from the microcode bundled into the system image you are running for that interface type.
<i>filename</i>	(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 flash . (This command results in the same default condition as the command microcode interface rom , which indicates that the card should be loaded from its onboard ROM microcode.)

Default

The default is to load from the microcode bundled in 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 series 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 DECserver 200 device code.

Default

Cisco device code

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 DECserver 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 †

0

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, Cisco 4000, or Cisco 7000 series, use the **reload EXEC** command if the configuration register has a boot value of 0. (For systems with a software configuration register, a value can be included on the **o/r** command line.) 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

partition flash

To partition Flash memory into two partitions, use the **partition flash** global configuration command. Use the **no** form of this command to undo partitioning, restoring Flash to one partition.

```
partition flash partitions [size1 size2]  
no partition flash
```

Syntax Description

<i>partitions</i>	Number of partitions in Flash memory. Can be 1 or 2.
<i>size1</i>	(Optional) Size of the first partition in megabytes.
<i>size2</i>	(Optional) Size of the second partition in megabytes.

Default

Flash memory consists of one partition.

Command Mode

Global configuration

Usage Guidelines

To undo partitioning, use either the **partition flash 1** or **no partition flash** command.

The **partition flash** command is available in IOS Release 10.0(6) or later.

Example

The following example creates two partitions of 4 MB each in Flash memory. Note that this example reflects the Dual Flash Bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
partition flash 2 4 4
```

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 compress-config

To compress configuration files on the Cisco 7000 series, Cisco 4000, Cisco 3000, and AGS+ routers, which have NVRAM, use the **service compress-config** global configuration command. To disable compression, use the **no** form of this command.

```
service compress-config
no service compress-config
```

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

If the file compression completes successfully, the following message is displayed:

```
Compressing configuration from configuration-size to compressed-size
[OK]
```

If the boot ROMs do not recognize a compressed configuration, the following message is displayed:

```
Boot ROMs do not support NVRAM compression Config NOT written to NVRAM
```

If the file compression fails, the following message is displayed:

```
Error trying to compress nvram
```

One way to determine whether a configuration file will compress enough to fit into NVRAM is to use a text editor to enter the configuration, then use the UNIX **compress** command to check the compressed size. To get a closer approximation of the compression ratio, use the UNIX command **compress -b12**.

Once the configuration file has been compressed, the router functions normally. A **show configuration** command would uncompress the configuration before displaying it. At boot time, the system would recognize that the configuration file was compressed, uncompress it, and proceed normally.

To disable compression of the configuration file, enter configuration mode and specify the **no service compress-config** command. Then enter the **write memory** command. The router displays an OK message if it is able to successfully write the uncompressed configuration to NVRAM. Otherwise, the router displays an error message indicating that the configuration is too large to store. If the configuration file is larger than the physical NVRAM, the following message is displayed:

```
###Configuration too large to fit uncompressed in NVRAM Truncate configuration? [confirm]
```

To truncate and save the configuration, type **y**. To not truncate and not save the configuration, type **n**.

Example

In the following example, the configuration file is compressed:

```
service compress-config
```

Related Command

show configuration

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-config. The default host configuration file is <host>-config, where <host> is the host name of the router. If the router cannot resolve its host name, the default host configuration file is router-config.

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 async-bootp

Use the **show async-bootp** privileged EXEC command to display the parameters that have been configured for SLIP extended BOOTP requests.

show async-bootp

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Sample Display

The following is a sample output of the **show async-bootp** command:

```
Router# show async-bootp

The following extended data will be sent in BOOTP responses:

bootfile (for address 128.128.1.1) "pcboot"
bootfile (for address 131.108.1.111) "dirtboot"
subnet-mask 255.255.0.0
time-offset -3600
time-server 128.128.1.1
```

Table 3-2 describes significant fields shown in the display.

Table 3-2 Show Async-BootP Field Descriptions

Field	Description
bootfile... "pcboot"	Boot file for address 128.128.1.1 is named pcboot.
subnet-mask 255.255.0.0	Subnet mask.
time-offset -3600	Local time is one hour (3600 seconds) earlier than UTC time.
time-server 128.128.1.1	Address of the time server for the network.

Related Command

async-bootp

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
```

The following is partial sample output from the **show configuration** command when the configuration file has been compressed:

```
Router# show configuration
Using 21542 out of 65536 bytes, uncompressed size = 142085 bytes
!
version 9.22
service compress-config
!
hostname hosehead
!
boot system flash gs7-k.sthormod_clean
boot system rom
```

Related Commands

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

- configure**
- description** †
- service compress-config**
- 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 might currently exist in Flash memory, and the amounts of Flash memory used and remaining.

```
show flash [all | chips | detailed | err | partition number [all | chips | detailed | err ] |
summary]
```

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 memory, including those that are invalidated.
chips	(Optional) Shows information per partition and per chip, including which bank the chip is in, its code, size, and name. This keyword is available in IOS Release 10.0(6) or later.
detailed	(Optional) Shows information per partition, including file length, address, name, Flash checksum, computer checksum, bytes used, bytes available, total bytes, and bytes of system Flash memory. This keyword is available in IOS Release 10.0(6) or later.
err	(Optional) Shows write or erase failures in the form of number of retries.
partition number	(Optional) Shows output for the specified partition number. If you specify the partition keyword, you must specify a partition number. This keyword is available in IOS Release 10.0(6) or later, and only when Flash memory has multiple partitions.
summary	(Optional) Shows summary information per partition, including the partition size, bank size, state, and method by which files can be copied into a particular partition. This keyword is available in IOS Release 10.0(6) or later, and only when Flash memory has multiple partitions.

Command Mode

EXEC

Sample Displays

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

```
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 3-3 describes the **show flash** display fields for the Cisco 3000 and Cisco 7000 series.

Table 3-3 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 memory (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** command on a router that has Flash memory partitioned. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```

Router# show flash
System flash directory, partition 1:
File Length Name/status
  1  3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
4096K bytes of processor board System flash (Read Only)

System flash directory, partition 2:
File Length Name/status
  1  3459720 igs-kf
[3459784 bytes used, 734520 available, 4194304 total]
4096K bytes of processor board System flash (Read/Write)

```

The following is a sample output from the **show flash all** command on the Cisco 3000 and Cisco 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 3-4 describes the **show flash all** display fields for the Cisco 3000 and Cisco 7000 series.

Table 3-4 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.

Field	Description
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:

```
Router> 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]
```

The following is sample output for the **show flash all** command on a Cisco 3000 that has Flash memory partitioned:

```
Router# show flash all
System flash partition information:
Partition  Size    Used    Free    Bank-Size  State      Copy-Mode
   1         4096K   3459K   637K    4096K     Read Only  RXBOOT-FLH
   2         4096K   3224K   872K    4096K     Read/Write Direct

System flash directory, partition 1:
File Length  Name/status
   addr      fcksum  ccksum
   1  3459720  master/igs-bfpx.100-4.3
      0x40      0x3DE1  0x3DE1
[3459784 bytes used, 734520 available, 4194304 total]
4096K bytes of processor board System flash (Read ONLY)
```

```

Chip      Bank      Code      Size      Name
  1        1        89A2     1024KB   INTEL 28F008SA
  2        1        89A2     1024KB   INTEL 28F008SA
  3        1        89A2     1024KB   INTEL 28F008SA
  4        1        89A2     1024KB   INTEL 28F008SA
Executing current image from System flash [partition 1]

```

```

System flash directory, partition2:
File Length Name/status
      addr      fcksum  ccksum
  1  3224008 igs-kf.100
      0x40      0xEE91  0xEE91
[3224072 bytes used, 970232 available, 4194304 total]
4096K bytes of processor board System flash (Read/Write)

```

```

Chip      Bank      Code      Size      Name
  1        2        89A2     1024KB   INTEL 28F008SA
  2        2        89A2     1024KB   INTEL 28F008SA
  3        2        89A2     1024KB   INTEL 28F008SA
  4        2        89A2     1024KB   INTEL 28F008SA

```

Table 3-5 describes the additional fields in the display.

Table 3-5 Show Flash All Fields for Partitioned Flash Memory

Field	Description
Partition	Partition number in Flash memory.
Size	Size of partition in bytes.
Used	Number of bytes used in partition.
Free	Number of bytes free in partition.
Bank-Size	Size of bank in bytes.
State	State of the partition. It can be one of the following values: Read-Only indicates the partition that is being executed from. Read/Write is a partition that can be copied to.
Copy-Mode	Method by which the partition can be copied to: <ul style="list-style-type: none"> • RXBOOT-FLH indicates copy via Flash load helper. • Direct indicates user can copy directly into Flash memory. • None indicates that it is not possible to copy into that partition.
Chip	Chip number.
Bank	Bank number.
Code	Code number.
Size	Size of chip.
Name	Name of chip.

The following is sample output for the **show flash chips** command on a router that has Flash memory partitioned. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
Router# show flash chips
System flash partition 1:
4096K bytes of processor board System flash (Read ONLY)

  Chip   Bank   Code   Size   Name
  ----   -
  1      1      89A2   1024KB INTEL 28F008SA
  2      1      89A2   1024KB INTEL 28F008SA
  3      1      89A2   1024KB INTEL 28F008SA
  4      1      89A2   1024KB INTEL 28F008SA
Executing current image from System flash [partition 1]

System flash partition 2:
4096K bytes of processor board System flash (Read/Write)

  Chip   Bank   Code   Size   Name
  ----   -
  1      2      89A2   1024KB INTEL 28F008SA
  2      2      89A2   1024KB INTEL 28F008SA
  3      2      89A2   1024KB INTEL 28F008SA
  4      2      89A2   1024KB INTEL 28F008SA
```

The following is sample output for the **show flash detailed** command on a router that has Flash memory partitioned. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
Router# show flash detailed
System flash directory, partition 1:
File Length Name/status
      addr      fcksum ccksum
  1  3224008 igs-kf.100
      0x40      0xEE91 0xEE91
[3224072 bytes used, 970232 available, 4194304 total]
4096K bytes of processor board System flash (Read/Write)

System flash directory, partition 2:
File Length Name/status
      addr      fcksum ccksum
  1  3224008 igs-kf.100
      0x40      0xEE91 0xEE91
[3224072 bytes used, 970232 available, 4194304 total]
4096K bytes of processor board System flash (Read/Write)
```

The following is sample output for the **show flash err** command on a Cisco 3000 that has Flash memory partitioned. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
Router# show flash err
System flash directory, partition 1:
File Length Name/status
  1  37376  master/igs-bfpx.100-4.3  [invalid checksum]
[37440 bytes used, 4156864 available, 4194304 total]
4096K bytes of processor board System flash (Read/Write)

  Chip   Bank   Code   Size   Name                erase  write
  ---   ---   ---   ---   ---
    1     1     89A2  1024KB INTEL 28F008SA      0     0
    2     1     89A2  1024KB INTEL 28F008SA      0     0
    3     1     89A2  1024KB INTEL 28F008SA      0     0
    4     1     89A2  1024KB INTEL 28F008SA      0     0
Executing current image from System flash [partition 1]

System flash directory, partition 2:
File Length Name/status
  1  37376  master/igs-bfpx.100-4.3  [invalid checksum]
[37440 bytes used, 4156864 available, 4194304 total]
4096K bytes of processor board System flash (Read/Write)

  Chip   Bank   Code   Size   Name                erase  write
  ---   ---   ---   ---   ---
    1     2     89A2  1024KB INTEL 28F008SA      0     0
    2     2     89A2  1024KB INTEL 28F008SA      0     0
    3     2     89A2  1024KB INTEL 28F008SA      0     0
    4     2     89A2  1024KB INTEL 28F008SA      0     0
```

The following is sample output for the **show flash summary** command on a router that has Flash memory partitioned. The partition that indicates a state of “Read Only” is the partition that is being executed from. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
Router# show flash summary
System flash partition information:
Partition  Size   Used   Free   Bank-Size  State      Copy-Mode
  ---     ---   ---   ---   ---        ---        ---
    1      4096K  2048K  2048K  2048K      Read Only  RXBOOT-FLH
    2      4096K  2048K  2048K  2048K      Read/Write Direct
```

Possible values for Copy-Mode are:

- RXBOOT-MANUAL—Copy manually by reloading to the boot ROM image.
- RXBOOT-FLH—Copy via FLH
- Direct—Copy directly into flash
- None—Copy not allowed

show flh-log

To display the system console output generated during the Flash load helper operation, use the show flh-log EXEC command.

show flh-log

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the show flh-log command:

```
Router# show flh-log
%FLH: abc/igs-kf.914 from 131.108.1.111 to flash ...

System flash directory:
File Length Name/status
  1 2251320 abc/igs-kf.914

[2251384 bytes used, 1942920 available, 4194304 total]
Accessing file 'abc/igs-kf.914' on 131.108.1.111...
Loading from 131.108.13.111:

Erasing device... .. erased
Loading from 131.108.13.111:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! [OK -
2251320/4194304 bytes]

Verifying checksum... OK (0x97FA)
Flash copy took 79292 msecs
%FLH: Re-booting system after download
Loading abc/igs-kf.914 at 0x3000040, size = 2251320 bytes [OK]

F3: 2183364+67924+259584 at 0x3000060

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
--More--

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.
1525 O'Brien Drive
Menlo Park, California 94025

3000 Software (IGS-KF), Engineering Version 9.14(7.6)
```

Copyright (c) 1986-1994 by cisco Systems, Inc.
Compiled Thu 07-Jul-94 13:26 [enf 1048]

cisco 2500 (68030) processor (revision 0x00) with 4092K/2048K bytes of
memory.

Processor board serial number 00000000

DDN X.25 software, Version 2.0, NET2 and BFE compliant.

ISDN software, Version 1.0.

Bridging software.

Enterprise software set supported. (0x0)

1 Ethernet/IEEE 802.3 interface.

2 Serial network interfaces.

--More--

1 ISDN Basic Rate interface.

32K bytes of non-volatile configuration memory.

4096K bytes of processor board System flash (Read ONLY)

Router#

show microcode

To show the microcode bundled into a 7000 Series 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 micro
Microcode bundled in system

Card      Microcode   Target Hardware   Description
Type      Version     Version           -----
----      -
SP        2.3         11.x              SP version 2.3
EIP       1.1         1.x               EIP version 1.1
TRIP     1.2         1.x               TRIP version 1.2
FIP      1.4         2.x               FIP version 1.4
HIP      1.1         1.x               HIP version 1.1
SIP      1.1         1.x               SIP version 1.1
FSIP     1.1         1.x               FSIP 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 series:

```
Router> show version

GS Software (GS7), Version 10.0
Copyright (c) 1986-1993 by cisco Systems, Inc.
Compiled Mon 11-Jan-93 14:44

System Bootstrap, Version 4.6(1)

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

RP1 (68040) processor with 16384K bytes of memory.
X.25 software.
Bridging software.
1 Switch Processor.
1 TRIP controller (4 Token Ring).
4 Token Ring/IEEE 802.5 interface.
1 AIP controller (1(ATM))
1 ATM network interface
4096K bytes of flash memory on embedded flash (in RP1).
Configuration register is 0x0
```

Table 3-6 describes significant fields shown in the display.

Table 3-6 Show Version Field Descriptions

Field	Description
GS Software, Version 10.0	Always specify the complete version number when reporting a possible software problem. In the example output, the version number is 10.0.
System Bootstrap, Version	Bootstrap version string.
Current date and time Boot date and time Router uptime is	Current date and time, the date and time the system was last booted, and <i>uptime</i> , 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
Running default software	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.
RPI....	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 that the router operate as a TFTP server, 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, the IP access list number.

```
tftp-server system filename [access-list-number]  
no tftp-server system filename [access-list-number]  
tftp-server system [flash:][partition-number:]filename [access-list-number]
```

Syntax Description

<i>filename</i>	Name you give the router Flash file
<i>access-list-number</i>	(Optional) IP access list number
flash:	(Optional) Specifies TFTP server operation from the file in the first partition of Flash. This command syntax is available in IOS Release 10.0(6) and later.
<i>partition-number:</i>	(Optional) Specifies TFTP server operation from the file in the specified partition of Flash. If the partition number is not specified, the file in the first partition is used. This command syntax is available in IOS Release 10.0(6) and later.
<i>filename</i>	Filename in the first or specified partition of Flash memory.

Default

Disabled

See also the Syntax Description and Usage Guidelines sections for more defaults.

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 the specified *filename* exists in Flash memory, a copy of the Flash image is sent.
- If the specified *filename* is not found in Flash memory, the ROM image is sent.

The command syntax **tftp-server system** [**flash:**][*partition-number:*]*filename* is available only in IOS Release 10.0(6) and later.

Examples

Assuming there is a file in Flash named *version-9.0*, the following example causes the router to send, via TFTP, a copy of the Flash 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
```

The following example causes the router to send, via TFTP, a copy of the file *flash:2:igs-bpx-1* when the requesting side specifies the name *flash:2:igs-bpx-1*. Note that this example reflects the Dual Flash Bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
tftp-server system flash:2:igs-bpx-1
```

Related Command

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

access-list †

verify flash

To verify the checksums of files in Flash memory, use the **verify flash** EXEC command.

verify flash

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command is available in IOS Release 10.0(6) or later. It performs the same action as the **copy verify flash** command.

Example

The following example illustrates how to use this command. Note that this example reflects the dual Flash bank feature available only on low-end systems (the AccessPro PC card, Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series).

```
Router# verify flash
System flash partition information:
Partition  Size    Used    Free    Bank-Size  State      Copy-Mode
   1         4096K   2048K   2048K   2048K      Read Only  RXBOOT-FLH
   2         4096K   2048K   2048K   2048K      Read/Write Direct

[ Type ?<no> for partition directory; ? for full directory; q to abort]
```

The system will prompt only if there are two or more read/write partitions. If the partition entered is not valid, the process terminates. You have the option to enter a partition number, **?** for directory display of all partitions, or **?number** for directory display of a particular partition. The default is the first partition.

```
File Length Name/status
  1  3459720 master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]

Name of file to verify? master/igs-bfpx.100-4.3
Verifying checksum for 'master/igs-bfpx.100-4.3' (file # 1)... OK
```

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:

```
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-config]?
Write file Router-config on host 131.108.1.111? [confirm]
#
Writing Router-config !! [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:

```
write terminal
```

Related Commands

configure

show configuration