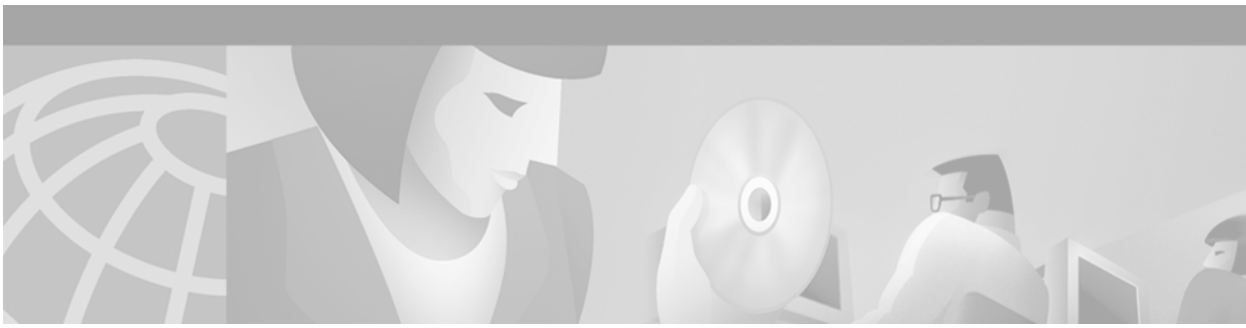


Rebooting

This chapter describes the basic procedure a Cisco device (such as a router) performs when it reboots, how to alter the procedure, and how to use the ROM monitor.

For a complete description of the booting commands mentioned in this chapter, refer to the "Booting Commands" chapter in the Release 12.2 *Cisco IOS Configuration Fundamentals Command Reference*. To locate documentation of other commands that appear in this chapter, use the *Cisco IOS Command Reference Master Index* or search online.

To identify hardware or software image support for a specific feature, use Feature Navigator on Cisco.com to search for information about the feature or refer to the software release notes for a specific release. For more information, see the "Identifying Platform Support for Cisco IOS Software Features" section in the "About Cisco IOS Software Documentation" chapter.

Understanding Rebooting Procedures

The following sections describe what happens when the router reboots:

- Which Configuration File Does the Router Use upon Startup?
- Which Image Does the Router Use upon Startup?

Which Configuration File Does the Router Use upon Startup?

On all platforms except Class A Flash file system platforms:

- If the configuration register is set to ignore NVRAM, the router enters setup mode.
- If the configuration register is not set to ignore NVRAM,
  - The startup software checks for configuration information in NVRAM.
  - If NVRAM holds valid configuration commands, the Cisco IOS software executes the commands automatically at startup.
  - If the software detects a problem with NVRAM or the configuration it contains (a CRC checksum error), it enters **setup** mode and prompts for configuration.

On Class A Flash file system platforms:

- If the configuration register is set to ignore NVRAM, the router enters setup mode.
- If the configuration register is not set to ignore NVRAM,
  - The startup software uses the configuration pointed to by the CONFIG_FILE environment variable.
  - When the CONFIG_FILE environment variable does not exist or is null (such as at first-time startup), the router uses NVRAM as the default startup device.
  - When the router uses NVRAM to start up and the system detects a problem with NVRAM or the configuration it contains, the router enters **setup** mode.

Problems can include a bad checksum for the information in NVRAM or an empty NVRAM with no configuration information. Refer to the "Troubleshooting Hardware and Booting Problems" chapter publication *Internetwork Troubleshooting Guide* for troubleshooting procedures. See the "Using Setup for Configuration Changes" chapter in this publication for details on the **setup** command facility. For more information on environment variables, refer to the "Setting Environment Variables" section.

Which Image Does the Router Use upon Startup?

When a router is powered on or rebooted, the following events happen:

- The ROM monitor initializes.
- The ROM monitor checks the boot field (the lowest four bits) in the configuration register.
  - If the last digit of the boot field is 0 (for example, 0x100), the system does not boot. Instead the system enters ROM monitor mode and waits for user intervention. From ROM monitor mode, you can manually boot the system using the **boot** or **b** command.
  - If the last digit of the boot field is1 (for example, 0x101), the boot helper image is loaded from ROM. (On some platforms, the boot helper image is specified by the BOOTLDR environment variable.)
  - If the last digit of the boot field is 2 through F (for example, 0x102 through 0x10F), the router boots the first valid image specified in the configuration file or specified by the BOOT environment variable.

Note The configuration register boot field value is expressed in hexadecimal. Because the boot field only encompasses the last four bits (represented by the last hexadecimal digit) of the configuration register value, the only digit we are concerned with in this discussion is the last digit. The makes 0x1 (0000 0001) equivalent to 0x101 (1 0000 0001) in discussions of the boot field, as in both cases the last four bits are 0001.

When the boot field is 0x102 through 0x10F, the router goes through each **boot system** command in order until it boots a valid image. If bit 13 in the configuration register is set, each command will be tried once (bit 13 is indicated by the position occupied by *b* in the following hexadecimal notation: 0x*b*000). If bit 13 is not set, the **boot system** commands specifying a network server will be tried up to five more times. The timeouts between each consecutive attempt are 2, 4, 16, 256, and 300 seconds.

If the router cannot find a valid image, the following events happen:

- If all boot commands in the system configuration file specify booting from a network server and all commands fail, the system attempts to boot the first valid file in Flash memory.
- If the “boot-default-ROM-software” option in the configuration register is set, the router will start the boot image (the image contained in boot ROM or specified by the BOORLDR environment variable).
- If the “boot-default-ROM-software” option in the configuration register is not set, the system waits for user intervention at the ROM monitor prompt. You must boot the router manually.
- If a fully functional system image is not found, the router will not function and must be reconfigured through a direct console port connection.

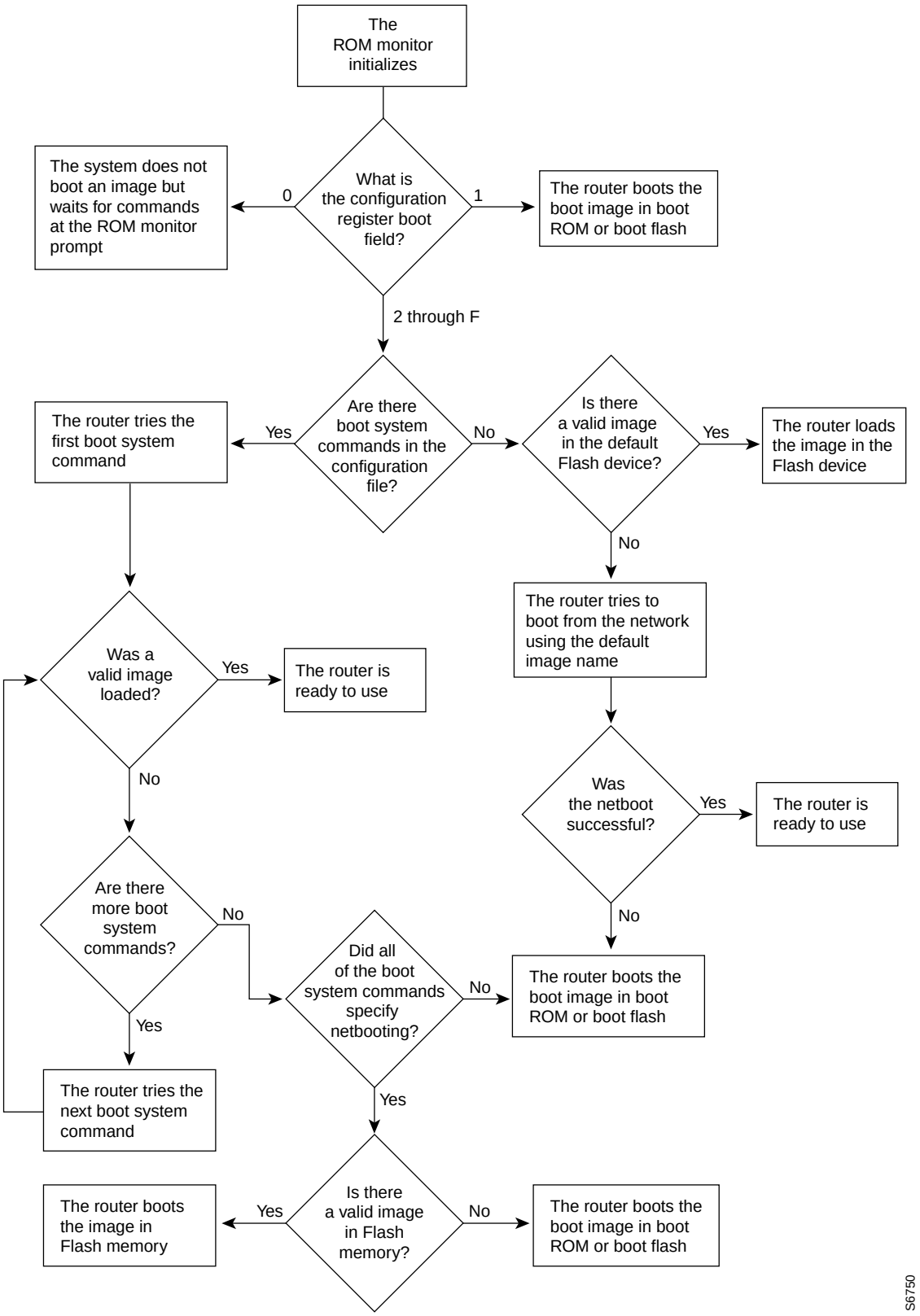
Note Refer to your platform documentation for information on the default location of the boot image.

When looking for a bootable file in Flash memory:

- The system searches for the filename in Flash memory. If a filename is not specified, the software searches through the entire Flash directory for a bootable file instead of picking only the first file.
- The system attempts to recognize the file in Flash memory. If the file is recognized, the software decides whether it is bootable by performing the following checks:
  - For run-from-Flash images, the software determines whether it is loaded at the correct execution address.
  - For run-from-RAM images, the software determines whether the system has enough RAM to execute the image.

Figure 12 illustrates the basic booting decision process.

Figure 12 Booting Process



Rebooting Task List

Tasks related to rebooting are described in the following sections:

- Displaying Boot Information
- Modifying the Configuration Register Boot Field
- Setting Environment Variables
- Scheduling a Reload of the System Image
- Entering ROM Monitor Mode
- Manually Loading a System Image from ROM Monitor

Displaying Boot Information

Use the following commands in EXEC mode to display information about system software, system image files, and configuration files:

Command	Purpose
`Router# show bootvar`	Lists the contents of the BOOT environment variable, the name of the configuration file pointed to by the CONFIG_FILE environment variable, and the contents of the BOOTLDR environment variable.
`Router# more nvram:startup-config`	Lists the startup configuration information. On all platforms except the Class A Flash file systems, the startup configuration is usually in NVRAM. On Class A Flash file systems, the CONFIG_FILE environment variable points to the startup configuration, defaulting to NVRAM.
`Router# show version`	Lists the system software release version, system image name, configuration register setting, and other information.

Refer to the Release 12.2 *Cisco IOS Configuration Fundamentals Command Reference* for examples of these commands.

You can also use the o command (or the **confreg** command for some platforms) in ROM monitor mode to list the configuration register settings on some platforms.

Modifying the Configuration Register Boot Field

The configuration register boot field determines whether the router loads an operating system image, and if so, where it obtains this system image. This section contains the following topics:

- How the Router Uses the Boot Field
- Hardware Versus Software Configuration Register Boot Fields
- Modifying the Software Configuration Register Boot Field

Refer to the documentation for your platform for more information on the configuration register.

How the Router Uses the Boot Field

The lowest four bits of the 16-bit configuration register (bits 3, 2, 1, and 0) form the boot field. The following boot field values determine if the router loads an operating system and where it obtains the system image:

- When the entire boot field equals 0-0-0-0 (0x0), the router does not load a system image. Instead, it enters ROM monitor or "maintenance" mode from which you can enter ROM monitor commands to manually load a system image. Refer to the "Manually Loading a System Image from ROM Monitor" section for details on ROM monitor mode.
- When the entire boot field equals 0-0-0-1 (0x1), the router loads the boot helper or rxboot image.
- When the entire boot field equals a value between 0-0-1-0 (0x2) and 1-1-1-1 (0xF), the router loads the system image specified by **boot system** commands in the startup configuration file. When the startup configuration file does not contain **boot system** commands, the router tries to load a default system image stored on a network server.

  When loading a default system image from a network server, the router uses the configuration register settings to determine the default system image filename for booting from a network server. 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 the default filename.

Hardware Versus Software Configuration Register Boot Fields

You modify the boot field from either the hardware configuration register or the software configuration register, depending on the platform.

Most platforms have use a software configuration register. Refer to your hardware documentation for information on the configuration register for your platform.

The hardware configuration register can be changed only on the processor card with dual in-line package (DIP) switches located at the back of the router. For information on modifying the hardware configuration register, refer to the appropriate hardware installation guide.

Modifying the Software Configuration Register Boot Field

To modify the software configuration register boot field, use the following commands:

	Command	Purpose
Step 1	`Router# show version`	Obtains the current configuration register setting. The configuration register is listed as a hexadecimal value.
Step 2	`Router# configure terminal`	Enters global configuration mode.
Step 3	`Router(config)# config-register value`	Modifies the existing configuration register setting to reflect the way in which you want to load a system image. The configuration register value is in hexadecimal form with a leading "0x."
Step 4	`Router(config)# end`	Exits configuration mode.

	Command	Purpose
Step 5	`Router# show version`	(Optional) Verifies that the configuration register setting is correct. Repeat steps 2 through 5 if the setting is not correct.
Step 6	`Router# copy running-config startup-config`	Saves the running configuration to the startup configuration.
Step 7	`Router# reload`	(Optional) Reboots the router to make your changes take effect.

In ROM monitor mode, use the **o** command or the **confreg** command on some platforms to list the value of the configuration register boot field.

Modify the current configuration register setting to reflect the way in which you want to load a system image. To do so, change the least significant hexadecimal digit to one of the following:

- 0 to load the system image manually using the **boot** command in ROM monitor mode.
- 1 to load the system image from boot ROMs. On the Cisco 7200 series and Cisco 7500 series, this setting configures the system to automatically load the system image from bootflash.
- 2–F to load the system image from **boot system** commands in the startup configuration file or from a default system image stored on a network server.

For example, if the current configuration register setting is 0x101 and you want to load a system image from **boot system** commands in the startup configuration file, you would change the configuration register setting to 0x102.

Modifying the Software Configuration Register Boot Field Example

In the following example, the **show version** command indicates that the current configuration register is set so that the router does not automatically load an operating system image. Instead, it enters ROM monitor mode and waits for user-entered ROM monitor commands. The new setting instructs the router to a load a system image from commands in the startup configuration file or from a default system image stored on a network server.

```
Router1# show version

Cisco IOS (tm) Software
4500 Software (C4500-J-M), Version 11.1(10.4), RELEASE SOFTWARE
Copyright (c) 1986-1997 by Cisco Systems, Inc.
Compiled Mon 07-Apr-97 19:51 by lmiller
Image text-base: 0x600088A0, data-base: 0x60718000

ROM: System Bootstrap, Version 5.1(1), RELEASE SOFTWARE (fc1)
FLASH: 4500-XBOOT Bootstrap Software, Version 10.1(1), RELEASE SOFTWARE (fc1)

Router1 uptime is 6 weeks, 5 days, 2 hours, 22 minutes
System restarted by error - a SegV exception, PC 0x6070F7AC
System image file is "c4500-j-mz.111-current", booted via flash

cisco 4500 (R4K) processor (revision 0x00) with 32768K/4096K bytes of memory.
Processor board ID 01242622
R4600 processor, Implementation 32, Revision 1.0
G.703/E1 software, Version 1.0.
Bridging software.
SuperLAT software copyright 1990 by Meridian Technology Corp).
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Basic Rate ISDN software, Version 1.0.
2 Ethernet/IEEE 802.3 interfaces.
2 Token Ring/IEEE 802.5 interfaces.
4 ISDN Basic Rate interfaces.
```

```
128K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read/Write)
4096K bytes of processor board Boot flash (Read/Write)

Configuration register is 0x2100

Router1# configure terminal
Router1(config)# config-register 0x210F
Router1(config)# end
Router1# reload
```

Setting Environment Variables

Because many platforms can boot images from several locations, these systems use special ROM monitor environment variables to specify the location and filename of images that the router is to use. In addition, Class A Flash file systems can load configuration files from several locations and use an environment variable to specify startup configurations.

These special environment variables are as follows:

- BOOT Environment Variable
- BOOTLDR Environment Variable
- CONFIG_FILE Environment Variable

BOOT Environment Variable

The BOOT environment variable specifies a list of bootable system images on various file systems. Refer to the “Specify the Startup System Image in the Configuration File” section in the “Loading and Maintaining System Images and Microcode” chapter of the *Configuration Fundamentals Configuration Guide*. After you save the BOOT environment variable to your startup configuration, the router checks the variable upon startup to determine the device and filename of the image to boot.

The router tries to boot the first image in the BOOT environment variable list. If the router is unsuccessful at booting that image, it tries to boot the next image specified in the list. The router tries each image in the list until it successfully boots. If the router cannot boot any image in the BOOT environment variable list, the router attempts to boot the boot image.

If an entry in the BOOT environment variable list does not specify a device, the router assumes the device is **tftp**. If an entry in the BOOT environment variable list specifies an invalid device, the router skips that entry.

BOOTLDR Environment Variable

The BOOTLDR environment specifies the Flash file system and filename containing the boot image that the ROM monitor uses if it cannot find a valid system image. In addition, a boot image is required to boot the router with an image from a network server.

You can change the BOOTLDR environment variable on platforms that use a software boot image rather than boot ROMs. On these platforms, the boot image can be changed without having to replace the boot ROM.

This environment variable allows you to have several boot images. After you save the BOOTLDR environment variable to your startup configuration, the router checks the variable upon startup to determine which boot image to use if the system cannot be loaded.

Note Refer to your platform documentation for information on the default location of the boot image.

CONFIG_FILE Environment Variable

For Class A Flash file systems, the CONFIG_FILE environment variable specifies the file system and filename of the configuration file to use for initialization (startup). Valid file systems can include **nvram:**, **bootflash:**, **slot0:**, and **slot1:**. Refer to the "Location of Configuration Files" section on page 146 in the "Modifying, Downloading, and Maintaining Configuration Files" chapter for more information on devices. After you save the CONFIG_FILE environment variable to your startup configuration, the router checks the variable upon startup to determine the location and filename of the configuration file to use for initialization.

The router uses the NVRAM configuration during initialization when the CONFIG_FILE environment variable does not exist or when it is null (such as at first-time startup). If the router detects a problem with NVRAM or a checksum error, the router enters **setup** mode. Refer to the "Using Setup for Configuration Changes" chapter in this publication for more information on the **setup** command facility.

Controlling Environment Variables

Although the ROM monitor controls environment variables, you can create, modify, or view them with certain commands. To create or modify the BOOT, BOOTLDR, and CONFIG_FILE environment variables, use the **boot system**, **boot bootldr**, and **boot config** global configuration commands, respectively.

Refer to the "Specify the Startup System Image in the Configuration File" section in the "Loading and Maintaining System Images" chapter of this book for details on setting the BOOT environment variable. Refer to the "Specify the Startup Configuration File" section in the "Managing Configuration Files" chapter of this document for details on setting the CONFIG_FILE variable.

Note When you use these three global configuration commands, you affect only the running configuration. You must save the environment variable settings to your startup configuration to place the information under ROM monitor control and for the environment variables to function as expected. Use the **copy system:running-config nvram:startup-config** command to save the environment variables from your running configuration to your startup configuration.

You can view the contents of the BOOT, BOOTLDR, and the CONFIG_FILE environment variables by issuing the **show bootvar** command. This command displays the settings for these variables as they exist in the startup configuration as well as in the running configuration if a running configuration setting differs from a startup configuration setting.

Use the **more nvram:startup-config** command to display the contents of the configuration file pointed to by the CONFIG_FILE environment variable.

Setting the BOOTLDR Environment Variable

To set the BOOTLDR environment variable, use the following commands, beginning in privileged EXEC mode:

	Command	Purpose
Step 1	`Router# dir [flash-filesystem:]`	Verifies that internal Flash or bootflash contains the boot helper image.
Step 2	`Router# configure terminal`	Enters the configuration mode from the terminal.
Step 3	`Router(config)# boot bootldr file-url`	Sets the BOOTLDR environment variable to specify the Flash device and filename of the boot helper image. This step modifies the runtime BOOTLDR environment variable.
Step 4	`Router# end`	Exits configuration mode.
Step 5	`Router# copy system:running-config nvram:startup-config`	Saves the configuration you just performed to the system startup configuration.
Step 6	`Router# show bootvar`	(Optional) Verifies the contents of the BOOTLDR environment variable.

The following example sets the BOOTLDR environment to change the location of the boot helper image from internal Flash to slot 0.

```
Router# dir bootflash:
-#- -length- -----date/time------ name
1   620      May 04 1995 26:22:04 rsp-boot-m
2   620      May 24 1995 21:38:14 config2

7993896 bytes available (1496 bytes used)
Router# configure terminal
Router (config)# boot bootldr slot0:rsp-boot-m
Router (config)# end
Router# copy system:running-config nvram:startup-config
[ok]
Router# show bootvar
BOOT variable = slot0:rsp-boot-m
CONFIG_FILE variable = nvram:
Current CONFIG_FILE variable = slot0:router-config

Configuration register is 0x0
```

Scheduling a Reload of the System Image

You may want to schedule a reload of the system image to occur on the router at a later time (for example, late at night or during the weekend when the router is used less), or you may want to synchronize a reload network-wide (for example, to perform a software upgrade on all routers in the network).

Note A scheduled reload must take place within approximately 24 days.

Configuring a Scheduled Reload

To configure the router to reload the Cisco IOS software at a later time, use one of the following commands in privileged EXEC command mode:

Command	Purpose
`Router# reload in [hh:]mm [text]`	Schedules a reload of the software to take effect in *mm* minutes (or *hh* hours and *mm* minutes) from now.
`Router# reload at hh:mm [month day | day month] [text]`	Schedules a reload of the software to take place at the specified time (using a 24-hour clock). If you specify the month and day, the reload is scheduled to take place at the specified time and date. If you do not specify the month and day, the reload takes place at the specified time on the current day (if the specified time is later than the current time), or on the next day (if the specified time is earlier than the current time). Specifying 00:00 schedules the reload for midnight.

Note The **at** keyword can only be used if the system clock has been set on the router (either through NTP, the hardware calendar, or manually). The time is relative to the configured time zone on the router. To schedule reloads across several routers to occur simultaneously, the time on each router must be synchronized with NTP. For information on configuring NTP, see the "Performing Basic System Management" chapter in the *Cisco IOS Network Management Configuration Guide*, Release 12.4.

The following example illustrates how to use the **reload** command to reload the software on the router on the current day at 7:30 p.m.:

```
Router# reload at 19:30
Reload scheduled for 19:30:00 UTC Wed Jun 5 1996 (in 2 hours and 25 minutes)
Proceed with reload? [confirm]
```

The following example illustrates how to use the **reload** command to reload the software on the router at a future time:

```
Router# reload at 02:00 jun 20
Reload scheduled for 02:00:00 UTC Thu Jun 20 1996 (in 344 hours and 53 minutes)
Proceed with reload? [confirm]
```

Display Information about a Scheduled Reload

To display information about a previously scheduled reload or to determine if a reload has been scheduled on the router, use the following command in EXEC command mode:

Command	Purpose
`Router# show reload`	Displays reload information, including the time the reload is scheduled to occur, and the reason for the reload if it was specified when the reload was scheduled.

Cancel a Scheduled Reload

To cancel a previously scheduled reload, use the following command in privileged EXEC command mode:

Command	Purpose
`Router# reload cancel`	Cancels a previously scheduled reload of the software.

The following example illustrates how to use the **reload cancel** command to stop a scheduled reload:

```
Router# reload cancel
Router#
***
*** --- SHUTDOWN ABORTED ---
***
```

Entering ROM Monitor Mode

During the first 60 seconds of startup, you can force the router to stop booting. The router will enter ROM monitor mode, where you can change the configuration register value or boot the router manually.

To stop booting and enter ROM monitor mode, use the following commands in EXEC mode:

	Command	Purpose

Step 1	`Router# reload`
	
	`Press the Break[1] key during the first 60 seconds while the system is booting.`
		Enter ROM monitor mode from privileged EXEC mode.

Step 2	**?**	List the ROM monitor commands.

1. This key will not work on the Cisco 7000 unless it has at least Cisco IOS Release 10 boot ROMs.

Timesaver

If you are planning to use ROM monitor mode on a regular basis, or wish users to load using ROM monitor commands, you can configure the system to default to ROMMON. To automatically boot your system in ROM monitor mode, reset the configuration register to 0x0 by using the **config-register 0x0** configuration command. The new configuration register value, 0x0, takes effect after the router or access server is rebooted with the **reload** command. If you set the configuration to 0x0, you will have to manually boot the system from the console each time you reload the router or access server.

To exit ROMMON mode, use the continue command. If you have changed the configuration, use the **copy running-config startup-config** command and then issue the **reload** command to save your configuration changes.

Aliasing ROM Monitoring Commands

The ROM monitor supports command aliasing modeled on the aliasing function built into the Korn shell. The **alias** command is used to set and view aliased names. This allows the user to alias command names to a letter or word. Aliasing is often used to shorten command names or automatically invoke command options.

Aliases are stored in NVRAM and remain intact across periods of no power. These are some of the set aliases:

- **b**—boot
- **h**—history
- **i**—intialize/reset
- **r**—repeat
- **k**—stack
- **?**—help

The following example shows a pre-aliased menu-type list for ROMMON commands:

```
> ?
$ state      Toggle cache state (? for help)
B [filename] [TFTP Server IP address | TFTP Server Name]
             Load and execute system image from ROM or from TFTP server
C [address]  Continue execution [optional address]
D /S M L V   Deposit value V of size S into location L with modifier M
E /S M L     Examine location L with size S with modifier M
G [address]  Begin execution
H            Help for commands
I            Initialize
K            Stack trace
L [filename] [TFTP Server IP address | TFTP Server Name]
             Load system image from ROM or from TFTP server, but do not
             begin execution
O            Show configuration register option settings
P            Set the break point
S            Single step next instruction
T function   Test device (? for help)
Deposit and Examine sizes may be B (byte), L (long) or S (short).
Modifiers may be R (register) or S (byte swap).
Register names are: D0-D7, A0-A6, SS, US, SR, and PC
```

If your options appear in the above menu-type format, you can use the listed aliased commands. To initialize the router or access server, enter the **i** command. The **i** command causes the bootstrap program to reinitialize the hardware, clear the contents of memory, and boot the system. To boot the system image file, use the **b** command.

The ROM monitor software characteristics will vary depending on your platform. For further details on ROM monitor mode commands, refer to the appropriate hardware installation guide, or perform a search on Cisco.com.

Manually Loading a System Image from ROM Monitor

If your router does not find a valid system image, or if its configuration file is corrupted at startup, or the configuration register is set to enter ROM monitor mode, the system enters ROM monitor mode. From this mode, you can manually load a system image from the following locations:

- Internal Flash memory or a Flash memory PC card
- A network server file
- ROM
- A local or remote computer, using the Xmodem or Ymodem protocol (Cisco 1600 series and Cisco 3600 series routers only)

You may only boot from a location if the router can store an image there. Therefore, not all platforms can manually load from these locations.

You can also enter ROM monitor mode by restarting the router and then pressing the **Break** key or issuing a "send break" command from a telnet session during the first 60 seconds of startup.

Manually Booting from Flash Memory in ROMMON

To manually boot from Flash memory, use the following command in ROM monitor mode:

Command	Purpose
`ROMMON >` **boot flash** [*filename*] `ROMMON >` **boot flash** *partition-number*:[*filename*] `ROMMON >` **boot flash flash:**[*partition-number*:] [*filename*] `ROMMON >` **boot** [*flash-fs*:][*partition-number*:][*filename*] (Cisco 1600 series and Cisco 3600 series) `ROMMON >` **boot** *device*:[*filename*] (Cisco 7000 family)	Manually boot the router from Flash. Refer to your hardware documentation for the correct form of this command to use.

If the filename is not specified, the first bootable file found in the device and partition is used.

In the following example, a router is manually booted from Flash memory. Because the optional *filename* argument is absent, the first valid file in Flash memory is loaded.

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

Booting gs7-k from flash memory RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR [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 **boot flash** command is used with the filename gs7-k—the name of the file that is loaded:

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

Booting gs7-k from flash memory RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
```

```
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRR [OK - 1903912/13765276 bytes]
F3: 1858676+45204+166896 at 0x1000

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System Bootstrap, Version 4.6(1012) [mlw 99], INTERIM SOFTWARE
Copyright (c) 1986-1992 by cisco Systems
RP1 processor with 16384 Kbytes of memory
```

The following command instructs the ROM monitor to boot the first file in the first partition of internal Flash memory:

```
> boot flash:
```

This command instructs the ROM monitor to boot the first file in the second partition of the Flash memory card in slot 0:

```
> boot slot0:2:
```

In this example, the ROM monitor boots the file named image name from the third partition of the Flash memory card in slot 0:

```
> boot slot0:3:imagename
```

The following command fails to specify a valid device type (**flash:**, **slot0:**, or **slot1:**), so the ROM monitor invokes the boot helper to boot a system image.

```
> boot flash
```

Manually Booting from a Network File in ROMMON

To manually boot from a network file, use the following command in ROM monitor mode:

Command	Purpose
`ROMMON >` **`boot`** *`filename`* `[`*`ip-address`*`]`	Manually boots the router from a network file.

In the following example, a router is manually booted from the network file *network1*:

```
>boot network1
```

Manually Booting from ROM in ROMMON

To manually boot the router from ROM, use the following command in ROM monitor mode:

Command	Purpose
`ROMMON >` **`boot`**	Manually boots the router from ROM.

On the Cisco 7200 series and Cisco 7500 series, the **boot** command loads the first bootable image located in bootflash.

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

```
>boot
```

Manually Booting Using MOP in ROMMON

You can interactively boot system software using MOP. Typically, you do this to verify that system software has been properly installed on the MOP boot server before configuring the router to automatically boot the system software image.

To manually boot the router using MOP, use the following command in ROM monitor mode:

Command	Purpose
ROMMON > **boot system mop** *filename* [*mac-address*] [*interface*]	Manually boots the router using MOP.

The Cisco 7200 series and Cisco 7500 series do not support the **boot mop** command.

In the following example, a router is manually booted from a MOP server:

```
>boot mop network1
```

Exiting from ROMMON

To return to EXEC mode from the ROM monitor, you must continue loading from the default system image. To exit ROMMON mode and resume loading, use the following command in ROM monitor mode:

Command	Purpose
ROMMON > **continue**	Resumes loading the startup configuration file and brings the user to EXEC mode.