



Using the ROM Monitor

This appendix describes the ROM monitor (also called the bootstrap program), which is the firmware that runs when you power on or restart the Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series router. During normal operation, the ROM monitor helps to initialize the processor hardware and boot the operating system software. You can also use the ROM monitor to help you isolate or rule out hardware problems encountered when installing your router.

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Entering the ROM Monitor Mode

To use the ROM monitor, you must have access to the console port. See the *Cisco 2600 Series Cabling and Setup Quick Start Guide* for information on connecting the console cable.

To enter ROM monitor mode, do the following:

Configure

	Command or Action	Purpose
Step 1	2600> <code>reload</code>	Restarts the router.
Step 2	Press the Break key during the first 60 seconds while the system is starting up	Forces the router to stop booting and enter the ROM monitor mode.

Verify

To verify that you are in the ROM monitor mode, check that the prompt displayed on your screen is the ROM monitor mode prompt:

```
rommon # >
```

The # is the line number and increases incrementally at each prompt.

**Tip**

From the Cisco IOS software, you can configure the router to automatically enter the ROM monitor mode the next time the router boots by setting virtual configuration register bits 3, 2, 1, and 0 to zero. From the console, enter the following configuration command:

```
configuration-register 0x0
```

The new configuration register value, 0x0, is effective after the router is rebooted with the **reload** command. The router remains in the ROM monitor and does not boot the operating system.

As long as the configuration register value remains 0x0, you must manually boot the operating system from the console. Refer to the **boot** command in the section “Command Descriptions” later in this appendix.

ROM Monitor Commands

Enter **?** or **help** at the ROM monitor mode prompt to display a list of available commands. For example:

```
rommon 1 > ?
alias          set and display aliases command
boot          boot up an external process
break         set/show/clear the breakpoint
confreg       configuration register utility
cont         continue executing a downloaded image
context       display the context of a loaded image
cookie        display contents of cookie PROM in hex
dev           list the device table
dir           list files in the file system
dis          display instruction stream
dnld         serial download a program module
frame        print out a selected stack frame
help         monitor builtin command help
history       monitor command history
meminfo      main memory information
repeat       repeat a monitor command
reset        system reset
set          display the monitor variables
stack        produce a stack trace
sync         write monitor environment to NVRAM
sysret       print out info from last system return
tftpdnld     tftp image download
unalias      unset an alias
unset        unset a monitor variable
xmodem       x/ymodem image download
rommon 2 >
```

**Note**

You can abort any command by pressing the Break key at the console.

**Note**

The command **tftpdnld** is present in the Cisco 2600 series routers only.

**Note**

The command **upgrade rom-monitor** is present in the Cisco 3700 series routers only.

ROM Monitor Syntax Conventions

The ROM monitor syntax in this appendix uses the following conventions:

- Square brackets [] denote an optional element. In the following example, the element *abc* is not required, but you can specify it if you choose:
`command [abc]`
- If a minus option is followed by a colon (for example, [-s:]) you must provide an argument for the option.
- A term in italics means that you must fill in the appropriate information. In the following example, you replace the term in italics with the interface type you are using:

```
command type interface
```

Command Descriptions

This section lists some useful ROM monitor commands. Refer to the Cisco IOS configuration guides and command references for more information on ROM monitor commands.



Note

The commands **show rom-monitor**, **showmon**, **upgrade rom-monitor**, **upgrade rom-monitor preference**, **rommon-pref** are present in the Cisco 3700 series routers only. The command **tftpdnld** is present in the Cisco 2600 series routers only.

- **boot** or **b**—Boots an image.
 - Boots from the first IOS image in flash memory.
 - `flash:[name]` boots the Cisco IOS software from the flash memory.
 - `filename tftpserver` boots from the specified file over the network from the specified TFTP server. For example:

```
boot c2600-i-mz 172.15.19.11
```
 - `filename` boots from the boothelper image, because it does not recognize the device ID. This form of the command is used to netboot the image named `filename`.
- The Cisco 2600 series router does not have a dedicated boothelper image ([rx]boot) as used by some other Cisco routers. With the Cisco 2600 series router, the first image in flash memory is invoked as the default boothelper image anytime the ROM monitor does not recognize the device ID in the **boot** command.
- You can override the default boothelper image setting by setting the BOOTLDR Monitor environment variable to point to another image. Any system image can be used for this purpose.
- Options to the boot command are **-x**, load image but do not execute, and **-v**, verbose.
- Use the Cisco IOS commands **show version** and **show hardware** to display the source of the currently running image.
- **dir device:[partition:]**—Lists the files on the named device. For example:

```
rommon 8 > dir flash:
```

File size	Checksum	File name
2229799 bytes (0x220627)	0x469e	C2600-j-m2.113-4T

- **help**—Displays a summary of ROM monitor commands (equivalent to ?).
- **meminfo**—Displays size in bytes, starting address, available range of main memory, the starting point and size of packet memory, and size of nonvolatile memory (NVRAM). The following example shows the **meminfo** command:

```
rommon 9 > meminfo

Main memory size: 32 MB.
Available main memory starts at 0xa000e000, size 32704KB
IO (packet) memory size: 25 percent of main memory.
NVRAM size: 32KB
```

- **meminfo [-l]**—The **meminfo** command with the **-l** option displays supported DRAM configurations. The following example shows an example of the **meminfo -l** command:

```
rommon 10 > meminfo -l

Supported memory configurations:

DIMM 0          DIMM 1
-----
                4M
                8M-DUAL
                16M
                32M-DUAL
4M
4M              4M
4M              8M-DUAL
4M              16M
4M              32M-DUAL
8M-DUAL
8M-DUAL        4M
8M-DUAL        8M-DUAL
8M-DUAL        16M
8M-DUAL        32M-DUAL
16M
16M            4M
16M            8M-DUAL
16M            16M
16M            32M-DUAL
32M-DUAL
32M-DUAL        4M
32M-DUAL        8M-DUAL
32M-DUAL        16M
32M-DUAL        32M-DUAL
```

- **reset** or **i**—Resets and initializes the router, similar to power on.
- **show rom-monitor**—Shows version of read-only ROMMON, and if present, the upgrade version of ROMMON. It also shows the current version of ROMMON, which version will be selected for execution when the Cisco IOS software is booted again. This command is available in the Cisco IOS exec mode.
 - **showmon**—Available in the ROMMON command mode. Provides the same information as the **show rom-monitor** command in the Cisco IOS exec mode.
- **upgrade rom-monitor <file<URL>|preference<readonly|upgrade>>**—Installs and reloads a new version of ROMMON in the Cisco IOS exec mode. URL refers to the path where the new ROMMON image is stored. Prompts the user to save the configuration.

- **upgrade rom-monitor preference<readonly|upgrade>**—Selects the version of ROMMON to be loaded the next time the router is reloaded. This command is used in the Cisco IOS exec mode.
- **rommon-pref**—Used in ROMMON command mode. Provides the same information as **upgrade rom-monitor preference** command in the Cisco IOS exec mode.

Debugging Commands

Most debugging commands are functional only when Cisco IOS software has crashed or is aborted. If you enter a debugging command and Cisco IOS crash information is not available, the following error message appears:

```
"xxx: kernel context state is invalid, can not proceed."
```

- **stack** or **k**—Produces a stack trace.
- **context**—Displays processor context.
- **frame**—Displays an individual stack frame.
- **sysret**—Displays return information from the last booted system image. This information includes the reason for terminating the image, a stack dump of up to eight frames, and, if an exception is involved, the address where the exception occurred. For example:

```
rommon 8 > sysret

System Return Info:
count: 19, reason: a SegV exception
pc:0x802b1040, error address: 0x802b1040
Stack Trace:
FP: 0x80908398, PC: 0x802b102c
FP: 0x809083b0, PC: 0x802b0b88
FP: 0x809083d8, PC: 0x8017039c
FP: 0x809083e8, PC: 0x8016f764
```

Configuration Register Commands

The virtual configuration register resides in NVRAM. You can display or modify the virtual configuration register from either the ROM monitor or the operating system software.

To change the virtual configuration register from the ROM monitor, enter the **confreg** command by itself for menu mode, or enter the new value of the register in hexadecimal.

- **confreg** [*hexnum*]—Changes the virtual configuration register to the value specified. The value is always interpreted as hexadecimal.



Note

Entering **confreg** without an argument displays the contents of the virtual configuration register and prompts you to alter the contents by describing the meaning of each bit. In either case, the new virtual configuration register value is written into NVRAM, but is not effective until you reset or power-cycle the router.

The following display shows an example of the **confreg** command:

```
rommon 7 > confreg

Configuration Summary
enabled are:
```

```

break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n [n]: y
enable "diagnostic mode"? y/n [n]: y
enable "use net in IP bcast address"? y/n [n]:
enable "load rom after netboot fails"? y/n [n]:
enable "use all zero broadcast"? y/n [n]:
disable "break/abort has effect"? y/n [n]:
enable "ignore system config info"? y/n [n]:
change console baud rate? y/n [n]: y
enter rate: 0 = 9600, 1 = 4800, 2 = 1200, 3 = 2400
           4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200 [0]: 0
change the boot characteristics? y/n [n]: y
enter to boot:
 0 = ROM Monitor
 1 = the boot helper image
 2-15 = boot system
 [0]: 0

```

```

Configuration Summary
enabled are:
diagnostic mode
break/abort has effect
console baud: 9600
boot: the ROM Monitor

```

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

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

Using the show rom-monitor Command



Note

The **show rom-monitor** command is present in the Cisco 3700 series routers only. The command **ftfndnld** is present in the Cisco 2600 series routers only.

The **show rom-monitor** command displays the current version of the read-only ROM monitor, and if present displays the upgrade version of the ROM monitor. The upgrade version is selected when the system is rebooted. This command runs in the Cisco IOS exec mode.

You get the following output, when the read-only ROM monitor is present:

```

Router# show rom-monitor
ReadOnly ROMMON version:
System Bootstrap, Version 12.2(4r)XT2, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
No upgrade ROMMON programmed or not yet run
Currently running ROMMON from ReadOnly region
ROMMON from ReadOnly region is selected for next boot
Router#

```

Following is an example of an output when both the read-only and the upgrade versions of the ROM monitor are present:

```
Router# show rom-monitor
```

```

ReadOnly ROMMON version:
System Bootstrap, Version 12.2(4r)XT4, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
Upgrade ROMMON version:
System Bootstrap, Version 12.2(8r)T1, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.
Currently running ROMMON from Upgrade region
ROMMON from Upgrade region is selected for next boot
Router#

```

**Note**

You can get the same information if you enter the **showmon** command in the ROMMON command mode.

Using the upgrade rom-monitor Command

**Note**

The command **upgrade rom-monitor** is present in the Cisco 3700 series routers only.

To upgrade the ROM monitor to a new version, use the **upgrade rom-monitor** command. Depending on where the image is located, use the following commands to upgrade the ROM monitor:

- `upgrade rom-monitor file <URL>`
- `upgrade rom-monitor preference <readonly | upgrade>`

The **upgrade rom-monitors file <URL>** command installs the new version of ROM monitor on the router by taking the image from the location indicated in the URL. The image is in the form of “.srec” file. It then reloads the router.

Following is an example of the output when the upgrade version of ROM monitor is located at `tftp://223.255.254.254/ajayhn/c3745_RM2.srec;`, and the system configuration has not been saved:

```

Router# upgrade rom-monitor file tftp://223.255.254.254/ajayhn/C3745\_RM2.srec

Loading ajayhn/C3745_RM2.srec from 223.255.254.254 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 641719/1283072 bytes]
This command will reload the router. Continue? [yes/no]: y
System configuration has been modified. Save? [yes/no]: y
Building configuration...
Erasing boot flash eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
Programming boot flash pppp
Now Reloading
System Bootstrap, Version 12.2(4r)XT4, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
Running new upgrade for first time
System Bootstrap, Version 12.2(8r)T1, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.
c3745 processor with 196608 Kbytes of main memory
Main memory is configured to 64 bit mode with parity disabled

Upgrade ROMMON initialized
rommon 1 >

```

Following sample output shows a configuration that has been saved:

```
Router# upgrade rom-monitor file tftp://223.255.254.254/ajayhn/C3745_RM2.srec
Loading ajayhn/C3745_RM2.srec from 223.255.254.254 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 641719/1283072 bytes]
This command will reload the router. Continue? [yes/no]: y
Erasing boot flash eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
Programming boot flash pppp
Now Reloading
System Bootstrap, Version 12.2(4r)XT4, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
Running new upgrade for first time
System Bootstrap, Version 12.2(8r)T1, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.
c3745 processor with 196608 Kbytes of main memory
Main memory is configured to 64 bit mode with parity disabled

Upgrade ROMMON initialized
rommon 1 >
```


Note

The **rommon-pref** command in the ROMMON command mode provides the same information as the **upgrade rom-monitor preference** command in the Cisco IOS Exec mod.

Procedures for Recovering Boot and System Images

If your router experiences difficulties and no longer contains a valid Cisco IOS software image in flash memory, you can recover the Cisco IOS image using one of the following ROM monitor commands:

- **xmodem**—Use this if the computer attached to your console has a terminal emulator that has xmodem capability.
- **tftpdnld**—Use this if you have a TFTP server directly connected to the Ethernet 0 port.


Note

The command **tftpdnld** is present in the Cisco 2600 series routers only.

Using the xmodem Command

The **xmodem** command establishes a connection between a console and the router console port for disaster recovery if both the boot and system images are erased from flash memory.

xmodem [*filename*]—Establishes an xmodem connection between the console and the router. The optional parameter *filename* specifies the source file containing the Cisco IOS image.

Other options include the following:

- **-c**—Uses cyclic redundancy check (CRC-16)
- **-y**—Uses Ymodem transfer protocol
- **-r**—Copies the image to DRAM for launch
- **-x**—Does not launch image on completion of download

Using the `tftpdnld` Command



Note

The command `tftpdnld` is present in the Cisco 2600 series routers only.

The `tftpdnld` command downloads a Cisco IOS software image from a remote server into flash memory using TFTP.

`tftpdnld`—Begins the TFTP copy command.

The following variables are required:

- IP_ADDRESS—IP address for the router you are using.
- IP_SUBNET_MASK—Subnet mask for the router you are using.
- DEFAULT_GATEWAY—Default gateway for the router you are using.
- TFTP_SERVER—IP address of the server from which you want to download the image file.
- TFTP_FILE—Name of the file that you want to download.
- The following variables are optional:
 - TFTP_VERBOSE—Print setting. 0=quiet, 1=progress, 2=verbose. The default is 1.
 - TFTP_RETRY_COUNT—Retry count for ARP and TFTP. The default is 7.
 - TFTP_TIMEOUT—Overall timeout of the download operation in seconds. The default is 2400 seconds.
 - TFTP_CHECKSUM—Performs a checksum test on the image. 0=no, 1=yes. The default is 1.

The syntax for specifying the variables is:

```
VARIABLE_NAME=value
```

After you specify the variables, you must reenter the `tftpdnld` command. For example:

```
rommon 1 > tftpdnld
rommon 2 > IP_ADDRESS=172.15.19.11
rommon 3 > IP_SUBNET_MASK=255.255.255.0
rommon 4 > DEFAULT_GATEWAY=172.15.19.1
rommon 5 > TFTP_SERVER=172.15.20.10
rommon 6 > TFTP_FILE=/tftpboot/c2600-i-mz
rommon 7 > TFTP_VERBOSE=1
rommon 8 > tftpdnld
```

```
IP_ADDRESS=172.15.19.11
IP_SUBNET_MASK=255.255.255.0
DEFAULT_GATEWAY=172.15.19.1
TFTP_SERVER=172.15.20.10
TFTP_FILE=/tftpboot/2600-i-mz
TFTP_VERBOSE=1
```

```
Invoke this command for disaster recovery only.
WARNING: all existing data in flash will be lost!
Do you wish to continue? y/n: [n]:
```

Enter **y** to begin downloading the Cisco IOS software image. When the process is complete, the ROM monitor mode prompt appears on your screen.

