ROM Monitor

This appendix describes the Cisco 1600 series router ROM monitor (also called the bootstrap program), the firmware that runs when the router is powered up or reset. The ROM monitor can help you isolate or rule out hardware problems encountered when installing your router.

This appendix contains the following sections:

- Entering the ROM Monitor
- ROM Monitor Commands
- Command Descriptions

Entering the ROM Monitor

In normal operation, the ROM monitor helps to initialize the processor hardware and boot the operating system software. To use the ROM monitor, you must have console port access. Refer to the section "Connecting the Console" in the chapter "Installing the Router."

From the operating system software, you can configure the router to remain in the ROM monitor the next time it boots by setting virtual configuration register bits 3, 2, 1, and 0 to zero. From the console, enter the following configuration command:

```
config-reg 0x0
```

The new configuration register value, 0x0, takes effect 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 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.

Timesaver   Break (system interrupt) is always enabled for 60 seconds after the router reboots, regardless of whether it is configured on or off in the configuration register. During this 60-second window, you can break to the ROM monitor prompt by pressing the **Break** key.

The Cisco 1600 ROM monitor prompt looks like this:

```
rommon 1>
```

In this example, 1 is the line number and is incremented at each prompt.

ROM Monitor Commands

Enter **?** or **help** at the ROM monitor prompt to display a list of available commands and options, as follows:

```
rommon 1> ?
help              monitor builtin command help
boot              boot up an external process
dir               list files in file system
dev               list the device table
confreg           configuration register utility
reset             system reset
stack             produce a stack trace
context           display the context of a loaded image
frame             print out a selected stack frame
sysret            print out info from last system return
meminfo           main memory information
rommon 2>
```

Note   To display information about command syntax, enter the command name followed by the **-?** option.

Commands are case sensitive. You can abort any command by pressing the **Break** key at the console.

Syntax Conventions

ROM monitor syntax in this appendix uses the same conventions described in "About This Guide."

Command Descriptions

The following ROM monitor commands are among the most useful:

- **help**—Display a summary of ROM monitor commands (equivalent to **?**).

- **boot** or **b**—Boot an image. The **boot** command with no arguments boots the first image in boot ROM memory as the system image.

  b *filename* [*host*] boots from the specified file over the network using Trivial File Transfer Protocol (TFTP). If a host is specified, by either name or IP address, the router boots from that host.

  b *device*[*:name*] boots from a local Flash memory device, **flash**, to boot the Cisco Internetwork Operating System (Cisco IOS). If the boot file *name* is not specified, the router boots from the first file in the specified device.

  b *flash [<partition#>]* [*filename*] uses the boot helper stored in ROM to boot the image in Flash. The partition number can be between 1 and 8.

  b *flash* [*:filename*] ROM attempts to boot the software image directly from Flash memory. However, will attempt to find the image file only in the first partition.

  Options to the boot command are **-x**, load image but do not execute, and **-v**, verbose.

  For more information about the **b** command, see the *Cisco IOS Configuration Guide* and *Cisco IOS Command Reference* publications.

- **reset** or **i**—Reset and initialize the router, similar to power on.

- **dev**—List boot device identifications on the router, for example:

```
rommon 10> dev
Devices in device table:
        id  name
    flash:  flash
eprom:  eprom
```

- **dir** *device*—List the files on the named device, **flash**, for example:

```
rommon 11> dir flash:
         File size            Checksum   File name
      2229799 bytes (0x220627)   0x469e    C1601-k
```

Console Download

Console download is a ROM monitor function that enables you to download to the router either a software image or a configuration file over the router's console port. After console download, the file is either saved to the Fast Flash memory card or to main memory for execution (image files only).

⚠ **Caution**   If you are using a PC to download a Cisco IOS image over the router's console port at 115200 bps, ensure that the PC's serial port is using a 16550 universal asynchronous transmitter/receiver (UART). If the PC's serial port is not using a 16550 UART, we recommend using a speed of 38400 or less when downloading a Cisco IOS image over the console port.

When to Use Console Download

Console download should be used when you do not have access to a Trivial File Transfer Protocol (TFTP) server.

Note The Cisco 1600 series routers do not support a command line interface software command for downloading files over the router's console port. If you want to download a software image or a configuration file to the router over the console port, you must use the ROM monitor command.

Command Decription

Following is the syntax for the console download command:

```
xmodem [-ycefrx] [-s baud_rate] <file_name>
```

Following is a syntax description for the console download command:

y (Optional) Sets the router to perform the download using ymodem protocol. Default is xmodem protocol. The following is the differences between xmodem and ymodem transfers:

- xmodem supports 128 block transfer size. ymodem supports a 1024 block transfer size.

- ymodem uses 16-bit cyclic redundancy check (CRC) (CRC-16) error checking to validate each packet. This function may not be supported by xmodem.

c (Optional) Performs the download using CRC-16 error checking to validate packets. Default is 8-bit CRC.

e (Optional) Erases Flash memory before starting the download. If there are other Flash memory partitions, this option erases the first partition only.

f (Optional) Erases the entire Flash memory (full erase).

r (Optional) Image is loaded into DRAM for execution. Default is to load the image into Flash memory.

x (Optional) Image is loaded into DRAM without being executed. The image can then be launched with the ROM monitor **launch** command.

-s *baud_rate*	(Optional) Specifies the download baud rate. Options are: **1200**, **2400**, **4800**, **9600**, **19200**, **38400**, **115200**.
	Note—This option should be used only when the router is directly connected to the host PC from which the software image will be downloaded. Do not use this option when downloading the software image over a modem connection.
	Default is baud rate currently specified in the configuration register
	This rate applies only during the data transfer. Once the data transfer is complete, the baud rate reverts to the rate specified in the configuration register.
file_name	The name of the system image file or the system configuration file. In order for the router to recognize it, the configuration file must be name *router-config*.

Error Reporting

Since the ROM monitor console download uses the console to perform the data transfer, error messages are only displayed on the console when the data transfer is terminated.

If an error does occur during a data transfer, the transfer is terminated and an error message is displayed. If you have changed the baud rate from the default rate (with the **s** option), the error message is followed by a message telling you to restore the terminal to the baud rate specified in the configuration register.

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, you see the following error message:

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

The following are debugging commands:

- **stack** or **k**—Produce a stack trace.

- **context**—Display processor context, for example:

```
rommon 9 > context
>CPU Context:
>d0 - 0x00000001    a0 - 0x0204f4ea
>d1 - 0x00000001    a1 - 0x00006b74
>d2 - 0x00000001    a2 - 0x0204f41c
>d3 - 0x00000000    a3 - 0x02003990
>d4 - 0x00000000    a4 - 0x00000000
>d5 - 0x00000000    a5 - 0x0000000f
>d6 - 0x00000000    a6 - 0x020039f4
>d7 - 0x00000064    a7 - 0x02003944
```

- >pc - 0x080716da   vbr - 0x0200acdc

- **frame**—Display an individual stack frame.

- **sysret**—Display 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: user break
pc:0x60043754,  error address: 0x0
Stack Trace:
FP: 0x80007e78, PC: 0x60043754
FP: 0x80007ed8, PC: 0x6001540c
FP: 0x80007ef8, PC: 0x600087f0
FP: 0x80007f18, PC: 0x80008734
```

- **meminfo**—Display size in bytes, starting address, available range of main memory, the starting point and size of packet memory, and size of nonvolatile random-access memory (NVRAM), for example:

```
rommon 9> meminfo

Main memory size: 2 MB.
Available main memory starts at 0x2005000, size 0x200000
NVRAM size: 8 KB.
```

Configuration Register

The virtual configuration register resides in NVRAM and is identical in operation to other Cisco routers. You can view 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 **confreg** by itself for menu mode, or enter the new value of the register in hexadecimal.

- **confreg** [*hexnum*]—Change the virtual configuration register to the value specified. The value is always interpreted as hexadecimal. 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 does not take effect until you reset or power-cycle the router.

The following display shows an example of menu mode:

```
rommon 7> confreg

    Configuration Summary
enabled are:
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]:
enable  "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  [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
```

```
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
```

Command Descriptions