APPENDIX E

Cisco 4000-M ROM Monitor

This appendix describes the Cisco 4000-M ROM monitor, which is also known as the bootstrap program. The ROM monitor can help you isolate or rule out hardware problems encountered when installing your router. A summary of the ROM monitor diagnostic tests and command options is provided.

Entering the Cisco 4000-M ROM Monitor Program

The ROM monitor diagnostics help initialize the processor hardware and boot the main operating system software. If you set the software configuration register (bits 3, 2, 1, and 0) to zero, you can start the server in the standalone ROM monitor. The ROM monitor prompt is an angle bracket (>).

Enter the following command at the ROM monitor prompt (>) to enable the Break key and to default to booting in the ROM monitor:

```
o/r 0x0
```

See Table E-1 for an explanation of the **o/r** command.

While running the system software, you can reset the configuration register to 0x0 by entering configuration mode, and then entering the following configuration command:

```
config-register 0x0
```

The new configuration register value, 0x0, takes effect after the router is rebooted. If you set the configuration to 0x0, you must manually boot the system each time you reboot the router.

Timesaver Break (system interrupt) is always enabled for 60 seconds after rebooting the system, regardless of whether Break is configured to be off by setting the configuration register. During the 60-second window, you can use Break to get to the ROM monitor prompt.

Available ROM Monitor Commands

At the ROM monitor prompt, enter a question mark (**?**) at the > prompt to display a list of available commands and options, as follows:

```
?
$       Toggle cache state
B [filename] [TFTP Server IP address | TFTP Server Name]
             Load and execute system image from ROM or from TFTP server
C [address]  Continue [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            Displays 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 software configuration register option settings
P            Set 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-A7, SS, US, SR, and PC.
```

The following Cisco 4000-M ROM monitor commands are among the most useful:

- Boot—The **b** command with no argument reboots the system and boots the default software from ROM as defined by the lower four bits of the configuration register, which form the boot field. You can include an argument, filename, to specify a file to be

booted over the network using the TFTP. You can also include a second argument, host, which is the Internet address or name of a particular server host. You must enter **i** and press **Return** before entering **b**. The various forms of the **b** command follow:

b—Boots the default system software from ROM.

b *filename [host]*—Boots from a network server (netboots) using TFTP.

b flash—Boots the first file in Flash memory

b flash *[filename]*—Boots the file (*filename*) from Flash memory

To prevent the router from automatically booting over the network, enter the **o/r 0x0** command as follows:

```
> o/r 0x0
```

- Continue—The **c** command allows you to exit the ROM monitor without rebooting the router after you press the **Break** key while running the system software image.
- Help—The **h** command prints a summary of the ROM monitor commands to the console screen.This is the same output as entering **?**.
- Initialize—The **i** command causes the ROM monitor to reinitialize the hardware, clear the contents of memory, and boot the system if so directed by the boot field in the virtual configuration register. (It is best to use the **i** command before running any tests or booting software.)
- Display Stack Trace—The **k** command displays a stack trace of the last running system software. This will be useful as a diagnostic reading if a problem occurs, such as an unexpected system crash.
- Display/Reset Virtual Configuration Register—The **o** command displays the virtual configuration register. The **o** command used with the **/r** option will reset the configuration register to the default and cause the system software image to ignore the configuration register information (sets the ignore NVRAM contents bit, 0x0040). To reset to the default, enter the following at the > prompt:

  ```
  o/r
  ```

Enter the **i** command after entering the **o/r** command to automatically reboot the router.

Table E-1 lists additional **o** command options.

Table E-1 o Command Options

Monitor Command	Function
o	Displays the virtual configuration register currently in effect, with a description of the bits
o/r	Resets the virtual configuration register to the defaults as follows: 9600-baud console UART[1] speed Break/abort has no effect Ignore the system configuration Boot from ROM
o/r *0xvalue*	Sets the virtual configuration register to the (hex) value, *value*

1. UART= Universal Asynchronous Receiver/Transmitter.

Note To enable the router to read the configuration file in nonvolatile RAM, clear the ignore NVRAM contents bit (0x0040) with the **config-register** command after using the **o/r** command.

- Memory/Bus Diagnostic—The **t m** command runs the memory test. By default, the memory test examines processor main memory.

Caution Save the configuration in a file on a host in your network as a backup before testing because the file could be lost.

To test memory, enter the **t** command with the **m** option at the > prompt, as follows:

```
> t m
```

To use the default addresses and select the default tests, press **Return** after each prompt appears.

The time to run a diagnostic is memory-size dependent. It will take a minimum of ten minutes. If the program encounters memory problems, it will display appropriate error messages on the console terminal. Be sure to reinitialize the processor before booting the system by entering **i** at the ROM monitor prompt.

Running the Diagnostics

Take the following steps to run the ROM monitor diagnostics:

Step 1 Turn OFF the unit.

Step 2 Restart the router.

Step 3 Within 60 seconds, press the **Break** key on the console terminal to force the server into the ROM monitor. Wait for the server to print the two-line banner message and for the (>) prompt to appear.