



# Using the ROM Monitor

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This document describes how to use the ROM monitor.

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## Platforms Supported by This Document

Use this document with the following platforms:

- Cisco 1800 series routers
- Cisco 2800 series routers
- Cisco 3800 series routers

## Prerequisites for Using the ROM Monitor

Connect a terminal or PC to the router console port. For help, see the quick start guide that shipped with your router, or see the hardware installation guide for your router.



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# Information About the ROM Monitor

Before using the ROM monitor, you should understand the following concepts:

- [ROM Monitor Mode Command Prompt](#), page 2
- [Why Is My Router in ROM Monitor Mode?](#), page 2
- [When Would I Use the ROM Monitor?](#), page 2
- [Tips for Using ROM Monitor Commands](#), page 3

## ROM Monitor Mode Command Prompt

The ROM monitor uses one of the following command prompts, depending on the version of ROM monitor software:

- The `rommon x >` prompt is used in newer versions of the ROM monitor. The `x` variable begins at 1 and increments each time you press **Return** or **Enter** in ROM monitor mode.
- The `>` prompt is used in older versions of the ROM monitor.

## Why Is My Router in ROM Monitor Mode?

Your router boots to ROM monitor mode when one of the following occurs:

- During power up or reload, the router does not find a valid system image.
- The last digit of the boot field in the configuration register is 0 (for example, 0x100 or 0x0).
- You enter the Break key sequence during the first 60 seconds after reloading the router.

To exit ROM monitor mode, see the [“Exiting ROM Monitor Mode”](#) section on page 23.

## When Would I Use the ROM Monitor?

Many users do not use the ROM monitor at all, except in the following uncommon situations:

- Manually loading a system image—You can load a system image without configuring the router to attempt to load that image in future system reloads or power cycles. This can be useful for testing a new system image or for troubleshooting. See the [“Loading a System Image \(boot\)”](#) section on page 8.
- Upgrading the system image when there are no TFTP servers or network connections, and a direct PC connection to the router console is the only viable option. See [“Upgrading the System Image.”](#)
- During troubleshooting if the router crashes and hangs. See the [“Troubleshooting Crashes and Hangs \(stack, context, frame, sysret, meminfo\)”](#) section on page 18.
- Disaster recovery—Use one of the following methods for recovering the system image or configuration file:
  - Console download (**xmodem**)—Use this method if the computer that is attached to your console has a terminal emulator that supports the xmodem protocol. See the [“Downloading Files over the Router Console Port \(xmodem\)”](#) section on page 9.

- TFTP download (**tftpdnld**)—Use this method if you can connect a TFTP server directly to the fixed LAN port on your router. See the “[Recovering the System Image \(tftpdnld\)](#)” section on page 14.
- Using the boot image (Rx-boot)—See the *How to Upgrade from ROMmon Using the Boot Image* tech note.




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**Note** Recovering the system image is different from upgrading the system image. You need to recover the system image if it becomes corrupt or if it is deleted because of a disaster that affects the memory device severely enough to require deleting all data on the memory device in order to load a system image.

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## Tips for Using ROM Monitor Commands

- ROM monitor commands are case sensitive.
- You can halt any ROM monitor command by entering the Break key sequence (**Ctrl-Break**) on the PC or terminal. The Break key sequence varies depending on the software on your PC or terminal. If **Ctrl-Break** does not work for you, see the *Standard Break Key Sequence Combinations During Password Recovery* tech note.
- To find out which commands are available on your router and to display command syntax options, see the “[Displaying Commands and Command Syntax in ROM Monitor Mode \(?, help, -?\)](#)” section on page 6.

## How to Use the ROM Monitor—Typical Tasks

This section contains the following procedures:

- [Entering ROM Monitor Mode](#), page 4
- [Displaying Commands and Command Syntax in ROM Monitor Mode \(?, help, -?\)](#), page 6
- [Displaying Files in a File System \(dir\)](#), page 7
- [Loading a System Image \(boot\)](#), page 8
- [Downloading Files over the Router Console Port \(xmodem\)](#), page 9
- [Modifying the Configuration Register \(confreg\)](#), page 11
- [Modifying the I/O Memory Using the iomemset Command](#), page 13
- [Recovering the System Image \(tftpdnld\)](#), page 14
- [Troubleshooting Crashes and Hangs \(stack, context, frame, sysret, meminfo\)](#), page 18
- [Exiting ROM Monitor Mode](#), page 23



**Note**

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This section does not describe how to perform all possible ROM monitor tasks. Use the command help to perform any tasks that are not described in this document. See the “[Displaying Commands and Command Syntax in ROM Monitor Mode \(?, help, -?\)](#)” section on page 6.

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## Entering ROM Monitor Mode

This section provides two methods of entering ROM monitor mode:

- [Using the Break Key Sequence to Interrupt the System Reload and Enter ROM Monitor Mode](#), page 4
- [Setting the Configuration Register to Boot to ROM Monitor Mode](#), page 5

### Prerequisites

Connect a terminal or PC to the router console port. For help, see the quick start guide that shipped with your router or see the hardware installation guide for your router.

### Using the Break Key Sequence to Interrupt the System Reload and Enter ROM Monitor Mode

This section describes how to enter ROM monitor mode by reloading the router and entering the Break key sequence.

#### SUMMARY STEPS

1. **enable**
2. **reload**
3. Press **Ctrl-Break**.

#### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>reload</b>  Example: Router# reload	Reloads the operating system.
Step 3	Press <b>Ctrl-Break</b> .	Interrupts the router reload and enters ROM monitor mode. <ul style="list-style-type: none"> <li>• You must perform this step within 60 seconds after you enter the <b>reload</b> command.</li> <li>• The Break key sequence varies, depending on the software on your PC or terminal. If <b>Ctrl-Break</b> does not work for you, see the <a href="#">Standard Break Key Sequence Combinations During Password Recovery</a> tech note.</li> </ul>

#### Troubleshooting Tips

The Break key sequence varies, depending on the software on your PC or terminal. See the [Standard Break Key Sequence Combinations During Password Recovery](#) tech note.

## What to Do Next

- Proceed to the [“Displaying Commands and Command Syntax in ROM Monitor Mode \(?, help, -?\)” section on page 6.](#)
- If you use the Break key sequence to enter ROM monitor mode when the router would have otherwise booted the system image, you can exit ROM monitor mode by doing one of the following:
  - Enter the **i** or **reset** command, which restarts the booting process and loads the system image.
  - Enter the **cont** command, which continues the booting process and loads the system image.

## Setting the Configuration Register to Boot to ROM Monitor Mode

This section describes how to enter ROM monitor mode by setting the configuration register to boot to ROM monitor mode at the next system reload or power cycle. For more information about the configuration register, see [“Changing the Configuration Register Settings.”](#)

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **config-register 0x0**
4. **exit**
5. **reload**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>config-register 0x0</b>  <b>Example:</b> Router(config)# config-register 0x0	Changes the configuration register settings. <ul style="list-style-type: none"> <li>• The 0x0 setting forces the router to boot to the ROM monitor at the next system reload.</li> </ul>

	Command or Action	Purpose
Step 4	<code>exit</code>  <b>Example:</b> <code>Router(config)# exit</code>	Exits global configuration mode.
Step 5	<code>reload</code>  <b>Example:</b> <code>Router# reload</code>  <output deleted>  <code>rommon 1&gt;</code>	Reloads the operating system. <ul style="list-style-type: none"> <li>Because of the 0x0 configuration register setting, the router boots to ROM monitor mode.</li> </ul>

## What to Do Next

Proceed to the [“Displaying Commands and Command Syntax in ROM Monitor Mode \(? , help, -?\)”](#) section on page 6.

## Displaying Commands and Command Syntax in ROM Monitor Mode (? , help, -?)

This section describes how to display ROM monitor commands and command syntax options.

### SUMMARY STEPS

- ?  
or  
**help**
- `command -?`

### DETAILED STEPS

	Command or Action	Purpose
Step 1	? or <code>help</code>  <b>Example:</b> <code>rommon 1 &gt; ?</code>  <b>Example:</b> <code>rommon 1 &gt; help</code>	Displays a summary of all available ROM monitor commands.
Step 2	<code>command -?</code>  <b>Example:</b> <code>rommon 16 &gt; dis -?</code>	Displays syntax information for a ROM monitor command.

## Examples

This section provides the following examples:

- [Sample Output for the ? or help ROM Monitor Command, page 7](#)
- [Sample Output for the xmodem -? ROM Monitor Command, page 7](#)

### Sample Output for the ? or help ROM Monitor Command

```
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 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
iomemset             set IO memory percent
meminfo              main memory information
repeat               repeat a monitor command
reset                system reset
rommon-pref          select ROMMON
set                  display the monitor variables
showmon              display currently selected ROM monitor
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
```

### Sample Output for the xmodem -? ROM Monitor Command

```
rommon 11 > xmodem -?

xmodem: illegal option -- ?
usage: xmodem [-cyrx] destination filename
-c CRC-16
-y ymodem-batch protocol
-r copy image to dram for launch
-x do not launch on download completion
```

## Displaying Files in a File System (dir)

This section describes how to display files in a file system, such as flash memory.

### SUMMARY STEPS

1. **dir** *file-system*

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>dir file-system</code>	Displays a list of the files and directories in the file system.
	<b>Example:</b> <code>rommon &gt; dir flash:</code>	

## Examples

```
rommon > dir flash:
```

```

      File size           Checksum  File name
2229799 bytes (0x220627)  0x469e  c2801-j-m2.113-4T

```

## Loading a System Image (boot)

This section describes how to load a system image using the **boot** ROM monitor command.

### Prerequisites

Determine the filename and location of the system image that you want to load.

### SUMMARY STEPS

1. **boot**  
or  
**boot flash:[filename]**  
or  
**boot filename tftpserver**  
or  
**boot [filename]**



## DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>boot</pre> <p>or</p> <pre>boot flash:[filename]</pre> <p>or</p> <pre>boot filename tftpserver</pre> <p>or</p> <pre>boot [filename]</pre> <p><b>Example:</b> ROMMON &gt; boot</p> <p><b>Example:</b> ROMMON &gt; boot flash:</p> <p><b>Example:</b> ROMMON &gt; boot someimage 172.16.30.40</p> <p><b>Example:</b> ROMMON &gt; boot someimage</p>	<p>In order, the examples here direct the router to:</p> <ul style="list-style-type: none"> <li>• Boot the first image in flash memory.</li> <li>• Boot the first image or a specified image in flash memory.</li> <li>• Boot the specified image over the network from the specified TFTP server (hostname or IP address).</li> <li>• Boot from the boot helper image because it does not recognize the device ID. This form of the command is used to boot a specified image from a network (TFTP) server.</li> </ul> <p>You can override the default boot helper image setting by setting the BOOTLDR Monitor environment variable to point to another image. Any system image can be used for this purpose.</p> <ul style="list-style-type: none"> <li>• Options to the <b>boot</b> command are <b>-x</b> (load image but do not execute) and <b>-v</b> (verbose).</li> </ul>

## What to Do Next

If you want to configure the router to load a specified image at the next system reload or power cycle, see the following documents:

- [“Upgrading the System Image”](#)
- [“Booting Commands”](#) chapter of the *Cisco IOS Configuration Fundamentals Command Reference*
- *Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*

## Downloading Files over the Router Console Port (xmodem)

This section describes how to download a file over the router console port using the **xmodem** ROM monitor command. Use the console download function when you do not have access to a TFTP server but need to download a system image or configuration file to the router. This procedure can also be used when there are no TFTP servers or network connections, and a direct PC connection to the router console is the only viable option.

## Prerequisites

- Download the file to your PC. Go to the Software Center at the following URL:  
<http://www.cisco.com/kobayashi/sw-center/index.shtml>.
- Connect your PC to the router console port and launch a terminal emulator program. To see examples for how to perform this task for similar routers, see the *Xmodem Console Download Procedure Using ROMmon* tech note.

## Restrictions

- If you use a PC to download a file over the router console port at 115,200 bps, make sure that the PC serial port uses a 16550 universal asynchronous receiver/transmitter (UART).
- If the PC serial port does not use a 16550 UART, we recommend using a speed equal to or lower than 38,400 bps for downloading a file over the console port.
- The **xmodem** transfer works only on the console port.
- You can only download files to the router. You cannot use **xmodem** to retrieve files from the router.
- Because the ROM monitor console download uses the console to perform the data transfer, error messages are displayed on the console only after the data transfer is terminated. If an error occurs during console download, the download is terminated, and an error message is displayed. If you changed the baud rate from the default rate, the error message is followed by a message that tells you to restore the terminal to the baud rate that is specified in the configuration register.

## SUMMARY STEPS

1. **xmodem** [-[c][y][r][x]] *destination-file-name*

## DETAILED STEPS

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**Step 1** **xmodem** [-[c][y][r][x]] *destination-file-name*

Use this command to download a file over the console port using the ROM monitor. For example:

```
rommon > xmodem -c c2801-is-mz.122-10a.bin
```

See [Table 1](#) for **xmodem** command syntax descriptions.

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**Table 1** *xmodem Command Syntax Descriptions*

Keyword or Argument	Description
<b>-c</b>	(Optional) Performs the download using 16-bit cyclic redundancy check (CRC) error checking to validate packets. Default is 8-bit CRC.
<b>-y</b>	(Optional) Performs the download using ymodem protocol. Default is xmodem protocol. The protocols differ as follows: <ul style="list-style-type: none"> <li>The xmodem protocol supports a 128-block transfer size, whereas the ymodem protocol supports a 1024-block transfer size.</li> <li>The ymodem protocol uses 16-bit CRC error checking to validate each packet. Depending on the device that the software is being downloaded from, the xmodem protocol might not support this function.</li> </ul>
<b>-r</b>	(Optional) Image is loaded into DRAM for execution. Default is to load the image into flash memory.
<b>-x</b>	(Optional) Image is loaded into DRAM without being executed.
<i>destination-file-name</i>	The name of the system image file or the system configuration file. For the router to recognize it, the name of the configuration file must be <i>router_config</i> .

## What to Do Next

If you want to configure the router to load a specified image at the next system reload or power cycle, see the following documents:

- [“Upgrading the System Image”](#)
- [“Booting Commands”](#) chapter of the *Cisco IOS Configuration Fundamentals Command Reference*
- *Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*

## Modifying the Configuration Register (confreg)

This section describes how to modify the configuration register by using the **confreg** ROM monitor command. You can also modify the configuration register setting from the Cisco IOS command-line interface (CLI) with the **config-register** global configuration command. For more information on the **config-register** global configuration command and the **confreg** ROM monitor command, see the *Cisco IOS Configuration Fundamentals Command Reference*.

## Prerequisites

To learn about the configuration register and the meaning of each of the 16 bits, see [“Changing the Configuration Register Settings.”](#)

## Restrictions

The modified configuration register value is automatically written into NVRAM, but the new value does not take effect until you reset or power cycle the router.

SUMMARY STEPS

1. **confreg** [value]

DETAILED STEPS

Command or Action	Purpose
<p>Step 1 <b>confreg</b> [value]</p> <p><b>Example:</b> rommon &gt; confreg 0x2102</p>	<p>Changes the configuration register settings while in ROM monitor mode.</p> <ul style="list-style-type: none"> <li>• Optionally, enter the new hexadecimal value for the configuration register. The value range is from 0x0 to 0xFFFF.</li> <li>• If you do not enter the value, the router prompts for each bit of the 16-bit configuration register.</li> <li>• For information about the configuration register and the function of each bit, see <a href="#">“Changing the Configuration Register Settings.”</a></li> </ul>

Examples

In the following example, the configuration register is set to boot the system image from flash memory:

```
rommon 3 > confreg 0x2102
```

In the following example, no value is entered; therefore, the system prompts for each bit in the register:

```
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]: <cr>
enable "load rom after netboot fails"? y/n [n]: <cr>
enable "use all zero broadcast"? y/n [n]: <cr>
enable "break/abort has effect"? y/n [n]: <cr>
enable "ignore system config info"? y/n [n]: <cr>
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
rommon 8>
```

## Modifying the I/O Memory Using the `iomemset` Command

This section describes how to modify the I/O memory by using the memory-size `iomemset` command.



### Note

Use the `iomemset` command only if required for temporarily setting I/O memory from ROM monitor mode. Using this command improperly can adversely affect the functioning of the router.

The Cisco IOS software can override the I/O memory percentage if the `memory-size iomem` command is set in the NVRAM configuration. If the Cisco IOS command is present in the NVRAM configuration, the I/O memory percentage set in the ROM monitor with the `iomemset` command is used only the first time the router is booted up. Subsequent reloads use the I/O memory percentage set by the `memory-size iomem` command saved in the NVRAM config.

If you need to set router I/O memory permanently using a manual method, use the `memory-size iomem` Cisco IOS command. If you set the I/O memory from the IOS software, you must restart the router for I/O memory to be set properly.

### SUMMARY STEPS

1. `iomemset i/o-memory percentage`

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>iomemset i/o-memory percentage</code>  <b>Example:</b> <code>rommon&gt; iomemset 15</code>	<ul style="list-style-type: none"> <li>• Reallocates the percentage of DRAM used for I/O memory and processor memory.</li> </ul>

### Examples

In the following example, the percentage of DRAM used for I/O memory is set to 15:

```
rommon 2 > iomemset
usage: iomemset [smartinit | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 ]
rommon 3 >
rommon 3 > iomemset 15
```

```
Invoking this command will change the io memory percent
*****WARNING:IOS may not keep this value*****
Do you wish to continue? y/n: [n]: y
```

```
rommon 4 > meminfo
-----
Current Memory configuration is:
Onboard SDRAM: Size = 128 MB : Start Addr = 0x10000000
-----Bank 0 128 MB
-----Bank 1 0 MB
Dimm 0: Size = 256 MB : Start Addr = 0x00000000
-----Bank 0 128 MB
-----Bank 1 128 MB
-----
Main memory size: 384 MB in 64 bit mode.
```

Available main memory starts at 0xa0015000, size 393132KB  
 IO (packet) memory size: 10 percent of main memory.  
 NVRAM size: 191KB

## Recovering the System Image (tftpdnld)

This section describes how to download a Cisco IOS software image from a remote TFTP server to the router flash memory by using the **tftpdnld** ROM monitor command.



### Caution

Use the **tftpdnld** ROM monitor command only for disaster recovery because it can erase all existing data in flash memory before it downloads a new software image to the router.

Before you can enter the **tftpdnld** ROM monitor command, you must set the ROM monitor environment variables.

## Prerequisites

Connect the TFTP server to a fixed network port on your router.

## Restrictions

- LAN ports on network modules or interface cards are not active in ROM monitor mode. Therefore, only a fixed port on your router can be used for TFTP download. This can be a fixed Ethernet port on the router, either of the two Gigabit Ethernet ports on Cisco routers with those ports.
- You can only download files to the router. You cannot use the **tftpdnld** command to retrieve files from the router.

## SUMMARY STEPS

1. **IP\_ADDRESS**=*ip\_address*
2. **IP\_SUBNET\_MASK**=*ip\_address*
3. **DEFAULT\_GATEWAY**=*ip\_address*
4. **TFTP\_SERVER**=*ip\_address*
5. **TFTP\_FILE**=[*directory-path*]/*filename*
6. **FE\_PORT**=[0 | 1]
7. **FE\_SPEED\_MODE**=[0 | 1 | 2 | 3 | 4 | 5]
8. **GE\_PORT**=[0 | 1]
9. **GE\_SPEED\_MODE**=[0 | 1 | 2 | 3 | 4 | 5]
10. **MEDIA\_TYPE**=[0 | 1]
11. **TFTP\_CHECKSUM**=[0 | 1]
12. **TFTP\_MACADDR**=*MAC\_address*
13. **TFTP\_RETRY\_COUNT**=*retry\_times*
14. **TFTP\_TIMEOUT**=*time*

15. **TFTP\_VERBOSE**=*setting*
16. **set**
17. **tftpdnld** [-hr]
18. **y**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>IP_ADDRESS</b> = <i>ip_address</i>  <b>Example:</b> rommon > IP_ADDRESS=172.16.23.32	Sets the IP address of the router.
Step 2	<b>IP_SUBNET_MASK</b> = <i>ip_address</i>  <b>Example:</b> rommon > IP_SUBNET_MASK=255.255.255.224	Sets the subnet mask of the router.
Step 3	<b>DEFAULT_GATEWAY</b> = <i>ip_address</i>  <b>Example:</b> rommon > DEFAULT_GATEWAY=172.16.23.40	Sets the default gateway of the router.
Step 4	<b>TFTP_SERVER</b> = <i>ip_address</i>  <b>Example:</b> rommon > TFTP_SERVER=172.16.23.33	Sets the TFTP server from which the software will be downloaded.
Step 5	<b>TFTP_FILE</b> =[ <i>directory-path/</i> ] <i>filename</i>  <b>Example:</b> rommon > TFTP_FILE=archive/rel22/c2801-i-mz	Sets the name and location of the file that will be downloaded to the router.
Step 6	<b>FE_PORT</b> =[0   1]  <b>Example:</b> rommon > FE_PORT=0	(Optional) Sets the input port to use one of the Fast Ethernet ports. Selects either fe 0/0 or fe 0/1.
Step 7	<b>FE_SPEED_MODE</b> =[0   1   2   3   4]  <b>Example:</b> rommon > FE_SPEED_MODE=3	(Optional) Sets the Fast Ethernet port speed mode, with these options: <ul style="list-style-type: none"> <li>• <b>0</b>—10 Mbps, half-duplex</li> <li>• <b>1</b>—10 Mbps, full-duplex</li> <li>• <b>2</b>—100 Mbps, half-duplex</li> <li>• <b>3</b>—100 Mbps, full-duplex</li> <li>• <b>4</b>—Automatic selection (default)</li> </ul>
Step 8	<b>GE_PORT</b> =[0   1]  <b>Example:</b> rommon > GE_PORT=0	(Optional) Sets the input port to use one of the Gigabit Ethernet ports (not available on Cisco 1800 series routers, Cisco 2801 routers, or Cisco 2811 routers). Selects either gig 0/0 or gig 0/1.

	Command or Action	Purpose
Step 9	<p><b>GE_SPEED_MODE</b>=[0   1   2   3   4   5]</p> <p><b>Example:</b> rommon &gt; GE_SPEED_MODE=3</p>	<p>(Optional) Sets the Gigabit Ethernet port speed mode, with these options:</p> <ul style="list-style-type: none"> <li>• <b>0</b>—10 Mbps, half-duplex</li> <li>• <b>1</b>—10 Mbps, full-duplex</li> <li>• <b>2</b>—100 Mbps, half-duplex</li> <li>• <b>3</b>—100 Mbps, full-duplex</li> <li>• <b>4</b>—1 Gbps, full-duplex</li> <li>• <b>5</b>—Automatic selection (default)</li> </ul> <p>(This option is not available on Cisco 1800 series routers, Cisco 2801 routers, or Cisco 2811 routers.)</p>
Step 10	<p><b>MEDIA_TYPE</b>=[0   1]</p> <p><b>Example:</b> rommon &gt; MEDIA_TYPE=1</p>	<p>(Optional) Sets the Gigabit Ethernet connection media type, RJ-45 (0) or SFP (1). Small form-factor pluggable (SFP) mode is applicable only if GE_PORT=0 (gig 0/0); RJ-45 mode is available on both gig 0/0 and gig 0/1 (GE_PORT = 0 or 1). (This option is not available on Cisco 1800 series routers, Cisco 2801 routers, or Cisco 2811 routers.)</p>
Step 11	<p><b>TFTP_CHECKSUM</b>=[0   1]</p> <p><b>Example:</b> rommon &gt; TFTP_CHECKSUM=0</p>	<p>(Optional) Determines whether the router performs a checksum test on the downloaded image.</p> <ul style="list-style-type: none"> <li>• <b>1</b>—Checksum test is performed (default).</li> <li>• <b>0</b>—No checksum test is performed.</li> </ul>
Step 12	<p><b>TFTP_MACADDR</b>=<i>MAC_address</i></p> <p><b>Example:</b> rommon &gt; TFTP_MACADDR=000e.8335.f360</p>	<p>(Optional) Sets the Media Access Controller (MAC) address for this router.</p>
Step 13	<p><b>TFTP_RETRY_COUNT</b>=<i>retry_times</i></p> <p><b>Example:</b> rommon &gt; TFTP_RETRY_COUNT=10</p>	<p>(Optional) Sets the number of times that the router attempts Address Resolution Protocol (ARP) and TFTP download.</p> <ul style="list-style-type: none"> <li>• The default is 7.</li> </ul>
Step 14	<p><b>TFTP_TIMEOUT</b>=<i>time</i></p> <p><b>Example:</b> TFTP_TIMEOUT=1800</p>	<p>(Optional) Sets the amount of time, in seconds, before the download process times out.</p> <ul style="list-style-type: none"> <li>• The default is 2400 seconds (40 minutes).</li> </ul>



	Command or Action	Purpose
Step 15	<p><b>TFTP_VERBOSE=setting</b></p> <p><b>Example:</b> rommon &gt; TFTP_VERBOSE=2</p>	<p>(Optional) Configures how the router displays file download progress, with these options:</p> <ul style="list-style-type: none"> <li>• <b>0</b>—No progress is displayed.</li> <li>• <b>1</b>—Exclamation points (!!!) are displayed to indicate file download progress. This is the default setting.</li> <li>• <b>2</b>—Detailed progress is displayed during the file download process; for example: <pre> Initializing interface. Interface link state up. ARPing for 1.4.0.1 ARP reply for 1.4.0.1 received. MAC address 00:00:0c:07:ac:01 </pre> </li> </ul>
Step 16	<p><b>set</b></p> <p><b>Example:</b> rommon &gt; set</p>	<p>Displays the ROM monitor environment variables.</p> <ul style="list-style-type: none"> <li>• Verify that you correctly configured the ROM monitor environment variables.</li> </ul>
Step 17	<p><b>tftpdnld [-hr]</b></p> <p><b>Example:</b> rommon &gt; tftpdnld</p>	<p>Downloads the system image specified by the ROM monitor environment variables.</p> <ul style="list-style-type: none"> <li>• Entering <b>-h</b> displays command syntax help text.</li> <li>• Entering <b>-r</b> downloads and boots the new software but does not save the software to flash memory.</li> <li>• Using no option (<b>-h</b> nor <b>-r</b>) downloads the specified image and saves it in flash memory.</li> </ul>
Step 18	<p><b>y</b></p> <p><b>Example:</b> Do you wish to continue? y/n: [n]: y</p>	<p>Confirms that you want to continue with the TFTP download.</p>

## Examples

### Sample Output for the set ROM Monitor Command

```
rommon 3 > set

PS1=rommon ! >
IP_ADDRESS=172.18.16.76
IP_SUBNET_MASK=255.255.255.192
DEFAULT_GATEWAY=172.18.16.65
TFTP_SERVER=172.18.16.2
TFTP_FILE=quake/rel22_Jan_16/c2801-i-mz
```

### Recovering the System Image (tftpdnld): Example

```
rommon 16 > IP_ADDRESS=171.68.171.0
rommon 17 > IP_SUBNET_MASK=255.255.254.0
rommon 18 > DEFAULT_GATEWAY=171.68.170.3
rommon 19 > TFTP_SERVER=171.69.1.129
rommon 20 > TFTP_FILE=c2801-is-mz.113-2.0.3.Q
rommon 21 > tftpdnld
```

```

IP_ADDRESS: 171.68.171.0
IP_SUBNET_MASK: 255.255.254.0
DEFAULT_GATEWAY: 171.68.170.3
TFTP_SERVER: 171.69.1.129
TFTP_FILE: c2801-is-mz.113-2.0.3.Q

```

Invoke this command for disaster recovery only.

WARNING: all existing data in all partitions on flash will be lost!

Do you wish to continue? y/n: [n]: **y**

```
Receiving c2801-is-mz.113-2.0.3.Q from 171.69.1.129 !!!!!.!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```
File reception completed.
```

```
Copying file c2801-is-mz.113-2.0.3.Q to flash.
```

```
Erasing flash at 0x607c0000
```

```
program flash location 0x60440000
```

```
rommon 22 >
```

## What to Do Next

If you want to configure the router to load a specified image at the next system reload or power cycle, see the following documents:

- [“Upgrading the System Image”](#)
- [“Booting Commands”](#) chapter of the *Cisco IOS Configuration Fundamentals Command Reference*
- *Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*

## Troubleshooting Crashes and Hangs (stack, context, frame, sysret, meminfo)

This section describes some ROM monitor commands that can be used to troubleshoot router crashes and hangs.

Most ROM monitor **debug** commands are functional only when the router crashes or hangs. If you enter a **debug** command when crash information is not available, the following error message appears:

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

The ROM monitor commands in this section are all optional and can be entered in any order.

### Router Crashes

A router or system *crash* is a situation in which the system detects an unrecoverable error and restarts itself. The errors that cause crashes are typically detected by processor hardware, which automatically branches to special error-handling code in the ROM monitor. The ROM monitor identifies the error, prints a message, saves information about the failure, and restarts the system. For detailed information about troubleshooting crashes, see the [Troubleshooting Router Crashes](#) and [Understanding Software-forced Crashes](#) tech notes.

### Router Hangs

A router or system *hang* is a situation in which the system does not respond to input at the console port or to queries sent from the network, such as Telnet and Simple Network Management Protocol (SNMP).

Router hangs occur when:

- The console does not respond
- Traffic does not pass through the router

Router hangs are discussed in detail in the [Troubleshooting Router Hangs](#) tech note.

## ROM Monitor Console Communication Failure

Under certain misconfiguration situations, it is possible to be unable to establish a console connection with the router due to a speed mismatch or other incompatibility. The most obvious symptom is garbage characters in the console display.

If a ROM monitor failure of this type occurs, you may need to change a jumper setting on the motherboard so the router can boot for troubleshooting. Procedures for accessing the motherboard and jumper locations are described in the installing and upgrading internal components sections of the hardware installation documentation for your router.

The jumper to be changed is DUART DFLT, which sets the console connection data rate to 9600 regardless of user configuration. The jumper forces the data rate to a known good value.

## Restrictions

Do not manually reload or power cycle the router unless reloading or power cycling is required for troubleshooting a router crash. The system reload or power cycle can cause important information to be lost that is needed for determining the root cause of the problem.

## SUMMARY STEPS

1. **stack**  
or  
**k**
2. **context**
3. **frame** *[number]*
4. **sysret**
5. **meminfo**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><code>stack</code></p> <p>or</p> <p><code>k</code></p> <p><b>Example:</b> rommon &gt; stack</p>	<p>(Optional) Obtains a stack trace.</p> <ul style="list-style-type: none"> <li>For detailed information on how to effectively use this ROM monitor command, see the <a href="#">Troubleshooting Router Hangs</a> tech note.</li> </ul>
Step 2	<p><code>context</code></p> <p><b>Example:</b> rommon &gt; context</p>	<p>(Optional) Displays the CPU context at the time of the fault.</p> <ul style="list-style-type: none"> <li>If available, the context from kernel mode and process mode of a loaded image is displayed.</li> </ul>
Step 3	<p><code>frame [number]</code></p> <p><b>Example:</b> rommon &gt; frame 4</p>	<p>(Optional) Displays an entire individual stack frame.</p> <ul style="list-style-type: none"> <li>The default is 0 (zero), which is the youngest frame.</li> </ul>
Step 4	<p><code>sysret</code></p> <p><b>Example:</b> rommon &gt; sysret</p>	<p>(Optional) Displays return information from the last booted system image.</p> <ul style="list-style-type: none"> <li>The return 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.</li> </ul>
Step 5	<p><code>meminfo [-l]</code></p> <p><b>Example:</b> rommon &gt; meminfo</p>	<p>(Optional) Displays memory information, including:</p> <ul style="list-style-type: none"> <li>Main memory size, starting address, and available range</li> <li>Packet memory size</li> <li>NVRAM size</li> </ul> <p>Alternatively, using the command <code>meminfo -l</code> provides information on supported DRAM configurations for the router.</p>

## Examples

This section provides the following examples:

- [Sample Output for the stack ROM Monitor Command, page 21](#)
- [Sample Output for the context ROM Monitor Command, page 21](#)
- [Sample Output for the frame ROM Monitor Command, page 22](#)
- [Sample Output for the sysret ROM Monitor Command, page 22](#)
- [Sample Output for the meminfo ROM Monitor Command, page 22](#)

**Sample Output for the stack ROM Monitor Command**rommon 6> **stack**

## Kernel Level Stack Trace:

Initial SP = 0x642190b8, Initial PC = 0x607a0d44, RA = 0x61d839f8  
 Frame 0 : FP= 0x642190b8, PC= 0x607a0d44, 0 bytes  
 Frame 1 : FP= 0x642190b8, PC= 0x61d839f8, 24 bytes  
 Frame 2 : FP= 0x642190d0, PC= 0x6079b6c4, 40 bytes  
 Frame 3 : FP= 0x642190f8, PC= 0x6079ff70, 32 bytes  
 Frame 4 : FP= 0x64219118, PC= 0x6079eaec, 0 bytes

## Process Level Stack Trace:

Initial SP = 0x64049cb0, Initial PC = 0x60e3b7f4, RA = 0x60e36fa8  
 Frame 0 : FP= 0x64049cb0, PC= 0x60e3b7f4, 24 bytes  
 Frame 1 : FP= 0x64049cc8, PC= 0x60e36fa8, 24 bytes  
 Frame 2 : FP= 0x64049ce0, PC= 0x607a5800, 432 bytes  
 Frame 3 : FP= 0x64049e90, PC= 0x607a8988, 56 bytes  
 Frame 4 : FP= 0x64049ec8, PC= 0x64049f14, 0 bytes

**Sample Output for the context ROM Monitor Command**rommon 7> **context**

## Kernel Level Context:

Reg	MSW	LSW	Reg	MSW	LSW
zero	: 00000000	00000000	s0	: 00000000	34018001
AT	: 00000000	24100000	s1	: 00000000	00000001
v0	: 00000000	00000003	s2	: 00000000	00000003
v1	: 00000000	00000000	s3	: 00000000	00000000
a0	: 00000000	0000002b	s4	: 00000000	64219118
a1	: 00000000	00000003	s5	: 00000000	62ad0000
a2	: 00000000	00000000	s6	: 00000000	63e10000
a3	: 00000000	64219118	s7	: 00000000	63e10000
t0	: 00000000	00070808	t8	: ffffffff	e7400884
t1	: 00000000	00000000	t9	: 00000000	00000000
t2	: 00000000	63e10000	k0	: 00000000	00000000
t3	: 00000000	34018001	k1	: 00000000	63ab871c
t4	: ffffffff	ffff80fd	gp	: 00000000	63c1c2d8
t5	: ffffffff	ffffffe	sp	: 00000000	642190b8
t6	: 00000000	3401ff02	s8	: 00000000	6429274c
t7	: 00000000	6408d464	ra	: 00000000	61d839f8
HI	: ffffffff	e57fce22	LO	: ffffffff	ea545255
EPC	: 00000000	607a0d44	ErrPC	: ffffffff	bfc05f2c
Stat	: 34018002		Cause	: 00000020	

## Process Level Context:

Reg	MSW	LSW	Reg	MSW	LSW
zero	: 00000000	00000000	s0	: 00000000	6401a6f4
AT	: 00000000	63e10000	s1	: 00000000	00000000
v0	: 00000000	00000000	s2	: 00000000	64049cf0
v1	: 00000000	00000440	s3	: 00000000	63360000
a0	: 00000000	00000000	s4	: 00000000	63360000
a1	: 00000000	00070804	s5	: 00000000	62ad0000
a2	: 00000000	00000000	s6	: 00000000	63e10000
a3	: 00000000	00000000	s7	: 00000000	63e10000
t0	: 00000000	00000000	t8	: ffffffff	e7400884
t1	: 00000000	64928378	t9	: 00000000	00000000
t2	: 00000000	00000001	k0	: 00000000	644822e8
t3	: ffffffff	fff00ff	k1	: 00000000	61d86d84
t4	: 00000000	6079eee0	gp	: 00000000	63c1c2d8

```

t5      : 00000000  00000001 | sp      : 00000000  64049cb0
t6      : 00000000  00000000 | s8     : 00000000  6429274c
t7      : 00000000  6408d464 | ra     : 00000000  60e36fa8
HI      : ffffffff  e57fce22 | LO     : ffffffff  ea545255
EPC     : 00000000  60e3b7f4 | ErrPC  : ffffffff  ffffffff
Stat    : 3401ff03                | Cause  : ffffffff
    
```

### Sample Output for the frame ROM Monitor Command

```
rommon 6 > frame 2
```

```

Stack Frame 2, SP = 0x642190d0, Size = 40 bytes
[0x642190d0 : sp + 0x000] = 0xffffffff
[0x642190d4 : sp + 0x004] = 0xbfc05f2c
[0x642190d8 : sp + 0x008] = 0xffffffff
[0x642190dc : sp + 0x00c] = 0xffffffff
[0x642190e0 : sp + 0x010] = 0x6401a6f4
[0x642190e4 : sp + 0x014] = 0x00000000
[0x642190e8 : sp + 0x018] = 0x64049cf0
[0x642190ec : sp + 0x01c] = 0x63360000
[0x642190f0 : sp + 0x020] = 0x63360000
[0x642190f4 : sp + 0x024] = 0x6079ff70
    
```

### Sample Output for the sysret ROM Monitor Command

```
rommon 8 > sysret
```

```

System Return Info:
count: 19, reason: user break
pc:0x801111b0, error address: 0x801111b0
Stack Trace:
FP: 0x80005ea8, PC: 0x801111b0
FP: 0x80005eb4, PC: 0x80113694
FP: 0x80005f74, PC: 0x8010eb44
FP: 0x80005f9c, PC: 0x80008118
FP: 0x80005fac, PC: 0x80008064
FP: 0x80005fc4, PC: 0xffff03d70
FP: 0x80005ffc, PC: 0x00000000
FP: 0x00000000, PC: 0x00000000
    
```

### Sample Output for the meminfo ROM Monitor Command

```
rommon 3 > meminfo
```

```

-----
Current Memory configuration is:
Onboard SDRAM: Size = 128 MB : Start Addr = 0x10000000
-----Bank 0 128 MB
-----Bank 1   0 MB
Dimm 0: Size = 256 MB : Start Addr = 0x00000000
-----Bank 0 128 MB
-----Bank 1 128 MB
-----
Main memory size: 384 MB in 64 bit mode.
Available main memory starts at 0xa0015000, size 393132KB
IO (packet) memory size: 10 percent of main memory.
NVRAM size: 191KB
    
```

You can also use the command **meminfo -l** to show the supported DRAM configurations for the router. Following is sample output:

```
rommon 4 > meminfo -l

The following 64 bit memory configs are supported:
-----
Onboard SDRAM          DIMM SOCKET 0        TOTAL MEMORY
Bank 0  Bank1          Bank 0 Bank 1
-----
128 MB  0 MB           0 MB  0 MB         128 MB
128 MB  0 MB           64 MB  0 MB         192 MB
128 MB  0 MB           64 MB  64 MB         256 MB
128 MB  0 MB           128 MB 0 MB         256 MB
128 MB  0 MB           128 MB 128 MB        384 MB
128 MB  0 MB           256 MB 0 MB         384 MB
```

## Troubleshooting Tips

See the following tech notes:

- [Troubleshooting Router Crashes](#)
- [Understanding Software-forced Crashes](#)
- [Troubleshooting Router Hangs](#)

## Exiting ROM Monitor Mode

This section describes how to exit ROM monitor mode and enter the Cisco IOS command-line interface (CLI). The method that you use to exit ROM monitor mode depends on how your router entered ROM monitor mode:

- If you reload the router and enter the Break key sequence to enter ROM monitor mode when the router would otherwise have booted the system image, you can exit ROM monitor mode by doing either of the following:
  - Enter the **i** command or the **reset** command, which restarts the booting process and loads the system image.
  - Enter the **cont** command, which continues the booting process and loads the system image.
- If your router entered ROM monitor mode because it could not locate and load the system image, perform the following steps.

### SUMMARY STEPS

1. **dir flash:***[directory]*
2. **boot flash:***[directory] [filename]*  
or  
**boot filename** *tftpserver*  
or  
**boot** *[filename]*

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><b>dir flash:</b> <i>[directory]</i></p> <p><b>Example:</b> rommon &gt; dir flash:</p>	<p>Displays a list of the files and directories in flash memory.</p> <ul style="list-style-type: none"> <li>Locate the system image that you want the router to load.</li> <li>If the system image is not in flash memory, use the second or third option in <a href="#">Step 2</a>.</li> </ul>
Step 2	<p><b>boot flash:</b> <i>[directory]</i> <i>[filename]</i></p> <p>or</p> <p><b>boot</b> <i>filename</i> <i>tftpserver</i></p> <p>or</p> <p><b>boot</b> <i>[filename]</i></p> <p><b>Example:</b> ROMMON &gt; boot flash:myimage</p> <p><b>Example:</b> ROMMON &gt; boot someimage 172.16.30.40</p> <p><b>Example:</b> ROMMON &gt; boot</p>	<p>In order, the examples here direct the router to:</p> <ul style="list-style-type: none"> <li>Boot the first image or a specified image in flash memory.</li> <li>Boot the specified image over the network from the specified TFTP server (hostname or IP address).</li> <li>Boot from the boothelper image because it does not recognize the device ID. This form of the command is used to netboot a specified image.</li> </ul> <p>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.</p> <p><b>Note</b> Options to the boot command are <b>-x</b> (load image but do not execute) and <b>-v</b> (verbose).</p>

## Examples

### Sample Output for the dir flash: ROM Monitor Command

```
rommon > dir flash:
          File size           Checksum   File name
2229799 bytes (0x220627)    0x469e    c2801-j-m2.113-4T
```

## What to Do Next

Now that you have a system image running on your router, configure the router to load the correct image at the next system reload or power cycle. See the following documents:

- “[Upgrading the System Image](#)”
- “[Booting Commands](#)” chapter of the *Cisco IOS Configuration Fundamentals Command Reference*
- Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*



## Additional References

The following sections provide references related to using the ROM monitor.

### Related Documents

Related Topic	Document Title
Connecting your PC to the router console port	<ul style="list-style-type: none"> <li>Quick start guide for your router</li> <li>Hardware installation guide for your router</li> </ul>
Break key sequence combinations for entering ROM monitor within the first 60 seconds of rebooting the router	<a href="#">Standard Break Key Sequence Combinations During Password Recovery</a>
Upgrading the ROM monitor	<p><a href="#">ROM Monitor Download Procedures for Cisco 2691, Cisco, 3631, Cisco 3725, and Cisco 3745 Routers</a></p> <p><b>Note</b> These procedures also apply to Cisco 1800 series, Cisco 2800 series, and Cisco 3800 series routers.</p>
Upgrading the system image	<a href="#">Upgrading the System Image</a>
Using the boot image (Rx-boot) to recover or upgrade the system image	<a href="#">How to Upgrade from ROMmon Using the Boot Image</a>
Configuration register	<a href="#">Changing the Configuration Register Settings</a>
Booting and configuration register commands	<a href="#">Cisco IOS Configuration Fundamentals Command Reference</a>
Loading and maintaining system images; rebooting	<a href="#">Cisco IOS Configuration Fundamentals and Network Management Configuration Guide</a>
Choosing and downloading system images	Software Center at <a href="http://www.cisco.com/kobayashi/sw-center/index.shtml">http://www.cisco.com/kobayashi/sw-center/index.shtml</a>
Console download ( <b>xmodem</b> )	<a href="#">Xmodem Console Download Procedure Using ROMmon</a>
Router crashes	<p><a href="#">Troubleshooting Router Crashes</a></p> <p><a href="#">Understanding Software-forced Crashes</a></p>
Router hangs	<a href="#">Troubleshooting Router Hangs</a>

### Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. <sup>1</sup>	<a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a>

1. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click Cancel at the login dialog box and follow the instructions that appear.

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