Using the ROM Monitor

Many users do not use the ROM monitor at all, unless 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, or you enter the Break key sequence during the first 60 seconds after reloading the router.

This document describes how to use the ROM monitor to manually load a system image, upgrade the system image when there are no TFTP servers or network connections, or for disaster recovery.

Contents

Platforms Supported by This Document

This document describes use of the ROM monitor with the following platforms:

- Cisco 1841 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 or 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

The ROM monitor uses the `rommon x >` command prompt. The *x* variable begins at 1 and increments each time you press **Return** or **Enter** in ROM monitor mode.

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 29.

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 10.
- 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 information about upgrading the system image in configuration documentation for your router.
- During troubleshooting if the router crashes and hangs—See the "Troubleshooting Crashes and Hangs (stack, context, frame, sysret, meminfo)" section on page 24.
- 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 15.

    For more information about using the Xmodem protocol, see the *Xmodem Console Download Procedure Using ROMmon* at the following URL:

    http://www.cisco.com/warp/public/130/xmodem_generic.html

- 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 20.

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.

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, 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 8.

Accessibility

This product can be configured using the Cisco command-line interface (CLI). The CLI conforms to accessibility code 508 because it is text based and because it relies on a keyboard for navigation. All functions of the router can be configured and monitored through the CLI.

For a complete list of guidelines and Cisco products adherence to accessibility, see Cisco Accessibility Products at the following URL:

http://www.cisco.com/web/about/responsibility/accessibility/products

How to Use the ROM Monitor—Typical Tasks

This section provides the following procedures:

- Exiting ROM Monitor Mode, page 29

Note 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 8.

Entering ROM Monitor Mode

This section provides two ways to enter ROM monitor mode:

- Using the Break Key Sequence to Interrupt the System Reload and Enter ROM Monitor Mode, page 5
- Setting the Configuration Register to Boot to ROM Monitor Mode, page 6

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	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**reload** **Example:** `Router# reload`	Reloads the operating system.
Step 3	Press **Ctrl-Break**. **Example:** `Router# send break`	Interrupts the router reload and enters ROM monitor mode. • You must perform this step within 60 seconds after you enter the **reload** command. • The Break key sequence varies, depending on the software on your PC or terminal. If **Ctrl-Break** does not work, see the *Standard Break Key Sequence Combinations During Password Recovery* tech note.

Examples

This section provides the following example:

Sample Output for the reload Command

```
Use break key sequence to enter rom monitor
Router# reload

Proceed with reload? [confirm]

*Sep 23 15:54:25.871: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
command.
telnet> send break

*** System received an abort due to Break Key ***
signal= 0x3, code= 0x0, context= 0x431aaf40
PC = 0x4008b5dc, Cause = 0x20, Status Reg = 0x3400c102
rommon 1 >
```

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 8.
- If you use 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 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.

Caution Do not set the configuration register by using the **config-register 0x0** command after you have set the baud rate. To set the configuration register without affecting the baud rate, use the the current configuration register setting by entering the **show ver | inc configuration** command, and then replacing the last (rightmost) number with a 0 in the configuration register command.

SUMMARY STEPS

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

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**config-register 0x0** **Example:** `Router(config)# config-register 0x0`	Changes the configuration register settings. • The 0x0 setting forces the router to boot to the ROM monitor at the next system reload.
Step 4	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode.
Step 5	**write memory** **Example:** `Router# write memory`	Sets to boot the system image from flash memory.

Step 6	**reload**
	
	Example:
	`Router# reload`
	
	`<output deleted>`
	
	`rommon 1>`
		Reloads the operating system.
		• Because of the 0x0 configuration register setting, the router boots to ROM monitor mode.

Examples

The following example shows how to set the configuration register to boot to ROM monitor mode:

```
Router>
Router> enable
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# config-register 0x0
Router(config)# exit
Router#
*Sep 23 16:01:24.351: %SYS-5-CONFIG_I: Configured from console by console
Router# write memory
Building configuration...
[OK]
Router# reload
Proceed with reload? [confirm]

*Sep 23 16:01:41.571: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
command.

System Bootstrap, Version 12.4(13r)T, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
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Initializing memory for ECC
.
Router platform with 262144 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled


Readonly ROMMON initialized
rommon 1 >
```

What to Do Next

Proceed to the "Displaying Commands and Command Syntax in ROM Monitor Mode (?, help, -?)" section on page 8.

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

1. **?**
   or
   help
2. *command* **-?**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**?**
	or
	help
	
	Example:
	`rommon 1 > ?`
	
	Example:
	`rommon 1 > help`
		Displays a summary of all available ROM monitor commands.

Step 2	*command* **-?** **Example:** `rommon 16 > display -?`	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 9
- Sample Output for the xmodem -? ROM Monitor Command, page 10

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
```

For more information about using Xmodem, see the *Xmodem Console Download Procedure Using ROMmon* at the following URL:

http://www.cisco.com/warp/public/130/xmodem_generic.html

Displaying Files in a File System (dir)

To display a list of the files and directories in the file system, use the **dir** command, as shown in the following example:

```
rommon 4 > dir flash:
program load complete, entry point: 0x8000f000, size: 0xcb80
Directory of flash:

3934    14871760  -rw-     c2800nm-ipbase-mz.124-3
7211    1447053   -rw-     C2800NM_RM2.srec
rommon 5 >  dir usbflash1:
program load complete, entry point: 0x8000f000, size: 0x3d240
Directory of usbflash1:

2      14871760  -rw-     c2800nm-ipbase-mz.124-3
```

Loading a System Image (boot)

This section describes how to load a system image by 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*]

   or

   boot usbflash<x>:[*filename*]

DETAILED STEPS

	Command or Action	Purpose

Step 1	**boot**
	or
	boot flash:[*filename*]
	or
	boot *filename tftpserver*
	or
	boot [*filename*]
	or
	boot usbflash[x]:[*filename*]
	
	Example:
	`ROMMON > boot`
	
	Example:
	`ROMMON > boot flash:`
	
	Example:
	`ROMMON > boot someimage 172.16.30.40`
	
	Example:
	`ROMMON > boot someimage`
	
	Example:
	`ROMMON > boot usbflash0:someimage`
		In order, the examples here direct the router to:
		• Boot the first image in flash memory.
		• Boot the first image or a specified image in flash memory.
		• Boot the specified image over the network from the specified TFTP server (hostname or IP address).
		• Boot from the boothelper 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.
		• Boot the image stored on the USB flash device.
		Note Platforms can boot from USB in ROM monitor with or without a compact flash device. It is not necessary to use a bootloader image from the compact flash device. Partitions, such as usbflash0:2:image_name, are not supported on USB flash drives. The **boot usbflash<x>**: command will boot the first file on the device, if it is a valid image.
		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 for the **boot** command are **-x** (load image but do not execute) and **-v** (verbose).

Examples

The following example shows how to load boot flash memory and USB boot flash memory:

```
rommon 7 > boot flash:[filename]
program load complete, entry point: 0x8000f000, size: 0xcb80

program load complete, entry point: 0x8000f000, size: 0xe2eb30
Self decompressing the image :
################################################################################################
############################################################ [OK]

Smart Init is enabled
Smart init is sizing iomem
  ID            MEMORY_REQ                TYPE
0003E9          0X003DA000 Router Mainboard
                0X0014B430 DSP SIMM
                0X000021B8 Onboard USB
                0X002C29F0 public buffer pools
                0X00211000 public particle pools
```

```
TOTAL:          0X009FAFD8

If any of the above Memory Requirements are
"UNKNOWN", you may be using an unsupported
configuration or there is a software problem and
system operation may be compromised.
Rounded IOMEM up to: 10Mb.
Using 3 percent iomem. [10Mb/256Mb]

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(fc2)
Technical Support: http://www.cisco.com/techsupport
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Compiled Fri 22-Jul-05 11:37 by hqluong
Image text-base: 0x40098478, data-base: 0x41520000

Port Statistics for unclassified packets is not turned on.
Cisco Router (revision 48.46) with 251904K/10240K bytes of memory.
Processor board ID
2 Gigabit Ethernet interfaces
2 Serial(sync/async) interfaces
2 Channelized T1/PRI ports
DRAM configuration is 64 bits wide with parity enabled.
239K bytes of non-volatile configuration memory.
253160K bytes of USB Flash usbflash1 (Read/Write)
127104K bytes of ATA CompactFlash (Read/Write)



Press RETURN to get started!


*Sep 23 16:11:42.603: %USB_HOST_STACK-6-USB_DEVICE_CONNECTED: A Full speed USB device has
been inserted in port 1.
*Sep 23 16:11:43.011: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Sep 23 16:11:43.383: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Sep 23 16:11:43.943: %LINK-3-UPDOWN: Interface Serial0/3/0, changed state to down
*Sep 23 16:11:43.947: %LINK-3-UPDOWN: Interface Serial0/3/1, changed state to down
*Sep 23 16:11:43.955: %USBFLASH-5-CHANGE: usbflash1 has been inserted!
*Sep 23 16:11:44.011: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
*Sep 23 16:11:44.383: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to down
*Sep 23 16:11:44.943: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed
state to down
*Sep 23 16:11:44.947: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/1, changed
state to down
*Sep 23 16:11:46.115: %SYS-5-CONFIG_I: Configured from memory by console
*Sep 23 16:11:46.327: %SYS-5-RESTART: System restarted --
```

```
Cisco IOS Software, 2800 Software (C2800NM-IPBASE-M), Version 12.4(3), RELEASE SOFTWARE
(fc2)
Technical Support: http://www.cisco.com/techsupport
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*Sep 23 16:11:46.331: %SNMP-5-COLDSTART: SNMP agent on host Router is undergoing a cold
start
*Sep 23 16:11:46.539: %SYS-6-BOOTTIME: Time taken to reboot after reload =  605 seconds
*Sep 23 16:11:46.735: %CONTROLLER-5-UPDOWN: Controller T1 0/2/0, changed state to down
(LOS detected)
*Sep 23 16:11:46.735: %CONTROLLER-5-UPDOWN: Controller T1 0/2/1, changed state to down
(LOS detected)
*Sep 23 16:11:48.055: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to
administratively down
*Sep 23 16:11:48.067: %LINK-5-CHANGED: Interface Serial0/3/0, changed state to
administratively down
*Sep 23 16:11:48.079: %LINK-5-CHANGED: Interface Serial0/3/1, changed state to
administratively down
Router>
rommon 1 > boot usbflash1:image
program load complete, entry point: 0x8000f000, size: 0x3d240

program load complete, entry point: 0x8000f000, size: 0xe2eb30
Self decompressing the image :
################################################################################################
############################################################## [OK]

Smart Init is enabled
Smart init is sizing iomem
  ID            MEMORY_REQ                TYPE
0003E9          0X003DA000 Router Mainboard
                0X0014B430 DSP SIMM
                0X000021B8 Onboard USB
                0X002C29F0 public buffer pools
                0X00211000 public particle pools
TOTAL:          0X009FAFD8

If any of the above Memory Requirements are
"UNKNOWN", you may be using an unsupported
configuration or there is a software problem and
system operation may be compromised.
Rounded IOMEM up to: 10Mb.
Using 3 percent iomem. [10Mb/256Mb]

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Compiled Fri 22-Jul-05 11:37 by hqluong
```

```
Image text-base: 0x40098478, data-base: 0x41520000

Port Statistics for unclassified packets is not turned on.
Cisco Router (revision 48.46) with 251904K/10240K bytes of memory.
Processor board ID
2 Gigabit Ethernet interfaces
2 Serial(sync/async) interfaces
2 Channelized T1/PRI ports
DRAM configuration is 64 bits wide with parity enabled.
239K bytes of non-volatile configuration memory.
253160K bytes of USB Flash usbflash1 (Read/Write)
127104K bytes of ATA CompactFlash (Read/Write)



Press RETURN to get started!


*Sep 23 16:19:56.611: %USB_HOST_STACK-6-USB_DEVICE_CONNECTED: A Full speed USB device has
been inserted in port 1.
*Sep 23 16:19:57.015: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Sep 23 16:19:57.391: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Sep 23 16:19:57.951: %LINK-3-UPDOWN: Interface Serial0/3/0, changed state to down
*Sep 23 16:19:57.955: %LINK-3-UPDOWN: Interface Serial0/3/1, changed state to down
*Sep 23 16:19:57.963: %USBFLASH-5-CHANGE: usbflash1 has been inserted!
*Sep 23 16:19:58.015: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
*Sep 23 16:19:58.391: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to down
*Sep 23 16:19:58.951: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed
state to down
*Sep 23 16:19:58.955: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/1, changed
state to down
*Sep 23 16:20:00.139: %SYS-5-CONFIG_I: Configured from memory by console
*Sep 23 16:20:00.351: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 2800 Software (C2800NM-IPBASE-M), Version 12.4(3), RELEASE SOFTWARE
(fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Fri 22-Jul-05 11:37 by hqluong
*Sep 23 16:20:00.355: %SNMP-5-COLDSTART: SNMP agent on host Router is undergoing a cold
start
*Sep 23 16:20:00.567: %SYS-6-BOOTTIME: Time taken to reboot after reload =   87 seconds
*Sep 23 16:20:00.763: %CONTROLLER-5-UPDOWN: Controller T1 0/2/0, changed state to down
(LOS detected)
*Sep 23 16:20:00.763: %CONTROLLER-5-UPDOWN: Controller T1 0/2/1, changed state to down
(LOS detected)
*Sep 23 16:20:02.083: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to
administratively down
*Sep 23 16:20:02.091: %LINK-5-CHANGED: Interface Serial0/3/0, changed state to
administratively down
*Sep 23 16:20:02.103: %LINK-5-CHANGED: Interface Serial0/3/1, changed state to
administratively down
Router>
```

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:

- "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 by using the Xmodem Protocol. 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.

For more information about using Xmodem, see the *Xmodem Console Download Procedure Using ROMmon* at the following URL:

http://www.cisco.com/warp/public/130/xmodem_generic.html

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.
- Transfer using the **xmodem** command works only on the console port.
- You can only download files to the router. You cannot use the **xmodem** command 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

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.

Table 1 xmodem Command Syntax Descriptions

Keyword or Argument	Description
-c	(Optional) Performs the download using 16-bit cyclic redundancy check (CRC) error checking to validate packets. The default setting is 8-bit CRC.
-y	(Optional) Performs the download using Ymodem protocol. The default setting is Xmodem protocol. The protocols differ as follows: • The Xmodem protocol supports a 128-block transfer size, whereas the ymodem protocol supports a 1024-block transfer size. • 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.
-r	(Optional) Image is loaded into DRAM for execution. The default setting is to load the image into flash memory.
-x	(Optional) Image is loaded into DRAM without being executed.
destination-file-name	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 *router_confg*.

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:

- "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) by using the **config-register** command in global configuration mode. For more information on the **config-register** command in global configuration mode and on using the **confreg** command in ROM monitor mode, see the *Cisco IOS Configuration Fundamentals Command Reference*.

Caution Do not set the configuration register by using the **config-register 0x0** command after setting the baud rate. To set the configuration register without affecting the baud rate, use the the current configuration register setting by entering the **show ver | inc configuration** command and then replacing the last (rightmost) number with a 0 in the configuration register command.

Prerequisites

To learn about the configuration register and the function of each of the 16 bits, see the *Changing the Configuration Register Settings* document.

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
Step 1	**confreg** [*value*] **Example:** `rommon > confreg 0x2102`	Changes the configuration register settings while in ROM monitor mode. • Optionally, enter the new hexadecimal value for the configuration register. The value range is from 0x0 to 0xFFFF. • If you do not enter the value, the router prompts for each bit of the 16-bit configuration register.

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

Obtaining Information on USB Flash Devices

This section describes how to obtain information on USB devices that are installed in the router. For instructions on booting from a USB flash device, see the "Loading a System Image (boot)" section on page 10.

SUMMARY STEPS

1. **dir usbflash** [**x**]:
2. **dev**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**dir usbflash** [**x**]: **Example:** `rommon > dir usbflash1:`	Displays the contents of the USB flash device, including directories, files, permissions, and sizes. • **0**—USB flash device inserted in port 0 • **1**—USB flash device inserted in port 1
Step 2	**dev** **Example:** `ROMMON > dev`	Shows the targeted USB flash devices that are inserted in the router and the valid device names that may or may not be currently inserted.

Examples

Sample Output for the dir usbFlash Command

```
rommon > dir usbflash0:
Directory of usbflash0:
2       18978364  -rw-     c3845-entbasek9-mz.124-0.5
```

```
Sample Output for the dev ROM Monitor Command
rommon 2 > dev
Devices in device table:
id   name
flash: compact flash
bootflash: boot flash
usbflash0: usbflash0
```

```
usbflash1: usbflash1

eprom: eprom
```

Modifying the I/O Memory (iomemset)

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

Note Use the **iomemset** command only if it is needed for temporarily setting the 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 using the **memory-size iomem** command that is saved in the NVRAM configuration.

If you need to set the router I/O memory permanently by using a manual method, use the **memory-size iomem** Cisco IOS command. If you set the I/O memory from the Cisco 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	**iomemset** *i/o-memory percentage* **Example:** `rommon> iomemset 15`	• Reallocates the percentage of DRAM used for I/O memory and processor memory.

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** command in ROM monitor mode.

Caution Use the **tftpdnld** 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** 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, that is 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_DESTINATION=**[flash: | usbflash0: | usbflash1:]

13. **TFTP_MACADDR=***MAC_address*
14. **TFTP_RETRY_COUNT=***retry_times*
15. **TFTP_TIMEOUT=***time*
16. **TFTP_VERBOSE=***setting*
17. **set**
18. **tftpdnld** [**-hr**]
19. **y**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**IP_ADDRESS=***ip_address* **Example:** `rommon > IP_ADDRESS=172.16.23.32`	Sets the IP address of the router.
Step 2	**IP_SUBNET_MASK=***ip_address* **Example:** `rommon > IP_SUBNET_MASK=255.255.255.224`	Sets the subnet mask of the router.
Step 3	**DEFAULT_GATEWAY=***ip_address* **Example:** `rommon > DEFAULT_GATEWAY=172.16.23.40`	Sets the default gateway of the router.
Step 4	**TFTP_SERVER=***ip_address* **Example:** `rommon > TFTP_SERVER=172.16.23.33`	Sets the TFTP server from which the software will be downloaded.
Step 5	**TFTP_FILE=**[*directory-path*/]*filename* **Example:** `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	**FE_PORT=**[**0** | **1**] **Example:** `rommon > FE_PORT=0`	(Optional) Sets the input port to use one of the Fast Ethernet ports.
Step 7	**FE_SPEED_MODE=**[**0** | **1** | **2** | **3** | **4**] **Example:** `rommon > FE_SPEED_MODE=3`	(Optional) Sets the Fast Ethernet port speed mode, with these options: • **0**—10 Mbps, half-duplex • **1**—10 Mbps, full-duplex • **2**—100 Mbps, half-duplex • **3**—100 Mbps, full-duplex • **4**—Automatic selection (default)

	Command or Action	Purpose
Step 8	**GE_PORT=**[**0** | **1**] **Example:** 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).
Step 9	**GE_SPEED_MODE=**[**0** | **1** | **2** | **3** | **4** | **5**] **Example:** rommon > GE_SPEED_MODE=3	(Optional) Sets the Gigabit Ethernet port speed mode, with these options: • **0**—10 Mbps, half-duplex • **1**—10 Mbps, full-duplex • **2**—100 Mbps, half-duplex • **3**—100 Mbps, full-duplex • **4**—1 Gbps, full-duplex • **5**—Automatic selection (default) (This option is not available on Cisco 1800 series routers, Cisco 2801 routers, or Cisco 2811 routers.)
Step 10	**MEDIA_TYPE=**[**0** | **1**] **Example:** rommon > MEDIA_TYPE=1	(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.)
Step 11	**TFTP_CHECKSUM=[0 | 1]** **Example:** rommon > TFTP_CHECKSUM=0	(Optional) Determines whether the router performs a checksum test on the downloaded image. • **1**—Checksum test is performed (default). • **0**—No checksum test is performed.
Step 12	**TFTP_DESTINATION=[flash: | usbflash0: | usbflash1:]** **Example:** rommon > TFTP_DESTINATION=usbflash0:	(Optional) Designates the targeted flash device as compact flash or USB flash. • **flash:**—Compact flash device (default). • **usbflash0:**—USB flash device inserted in port 0 • **usbflash1:**—USB flash device inserted in port 1
Step 13	**TFTP_MACADDR=***MAC_address* **Example:** rommon > TFTP_MACADDR=000e.8335.f360	(Optional) Sets the Media Access Controller (MAC) address for this router.
Step 14	**TFTP_RETRY_COUNT=***retry_times* **Example:** rommon > TFTP_RETRY_COUNT=10	(Optional) Sets the number of times that the router attempts Address Resolution Protocol (ARP) and TFTP download. The default is 7.
Step 15	**TFTP_TIMEOUT=***time* **Example:** TFTP_TIMEOUT=1800	(Optional) Sets the amount of time, in seconds, before the download process times out. The default is 2400 seconds (40 minutes).

	Command or Action	Purpose

Step 16	**TFTP_VERBOSE=***setting*
	
	Example:
	`rommon > TFTP_VERBOSE=2`
		(Optional) Configures how the router displays file download progress, with these options:
		• **0**—No progress is displayed.
		• **1**—Exclamation points (!!!) are displayed to indicate file download progress. This is the default setting.
		• **2**—Detailed progress is displayed during the file download process; for example:
		`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`

Step 17	**set** **Example:** `rommon > set`	Displays the ROM monitor environment variables. Verify that you correctly configured the ROM monitor environment variables.
Step 18	**tftpdnld** [**-h**] [**-r**] **Example:** `rommon > tftpdnld`	Downloads the system image specified by the ROM monitor environment variables. • Entering **-h** displays command syntax help text. • Entering **-r** downloads and boots the new software but does not save the software to flash memory. • Using no option (that is, using neither **-h** nor **-r**) downloads the specified image and saves it in flash memory.
Step 19	**y** **Example:** `Do you wish to continue? y/n:  [n]:  y`	Confirms that you want to continue with the TFTP download.

Examples

Sample Output for Recovering the System Image (tftpdnld)

```
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 >
```

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=anyname/rel22_Jan_16/c2801-i-mz
```

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:

- "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 lists and 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 can be impossible to establish a console connection with the router due to a speed mismatch or other incompatibility. The most obvious symptom is erroneous 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 that the router can boot for troubleshooting. Procedures for accessing the motherboard and jumper locations are described in the installation of internal components section of the hardware installation document 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	**stack** or **k** **Example:** `rommon > stack`	(Optional) Obtains a stack trace. • For detailed information on how to effectively use this command in ROM monitor mode, see the *Troubleshooting Router Hangs* tech note.
Step 2	**context** **Example:** `rommon > context`	(Optional) Displays the CPU context at the time of the fault. • If it is available, the context from kernel mode and process mode of a loaded image is displayed.

	Command or Action	Purpose
Step 3	**frame** [*number*] **Example:** `rommon > frame 4`	(Optional) Displays an entire individual stack frame. • The default is 0 (zero), which is the most recent frame.
Step 4	**sysret** **Example:** `rommon > sysret`	(Optional) Displays return information from the last booted system image. • 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 at which the exception occurred.
Step 5	**meminfo** [-l] **Example:** `rommon > meminfo`	(Optional) Displays memory information, including: • Main memory size, starting address, and available range • Packet memory size • NVRAM size Alternatively, using the **meminfo -l** command provides information on supported DRAM configurations for the router.

Examples

This section provides the following examples:

- Sample Output for the stack ROM Monitor Command, page 27
- Sample Output for the context ROM Monitor Command, page 27
- Sample Output for the frame ROM Monitor Command, page 28
- Sample Output for the sysret ROM Monitor Command, page 28
- Sample Output for the meminfo ROM Monitor Command, page 28

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   fffffffe   | 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   ffff00ff   | 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: 0xfff03d70
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 **meminfo -l** command to show the supported DRAM configurations for the router. The following is sample output for the command:

```
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 steps in the following procedure.

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	**dir flash:**[*directory*] **Example:** `rommon > dir flash:`	Displays a list of the files and directories in flash memory. • Locate the system image that you want the router to load. • If the system image is not in flash memory, use the second or third option in Step 2.

Step 2	**boot flash:**[*directory*] [*filename*]
	
	or
	
	boot *filename tftpserver*
	
	or
	
	boot [*filename*]
	
	Example:
	`ROMMON > boot flash:myimage`
	
	Example:
	`ROMMON > boot someimage 172.16.30.40`
	
	Example:
	`ROMMON > boot`
		In order, the examples here direct the router to:
		• Boot the first image or a specified image in flash memory.
		• Boot the specified image over the network from the specified TFTP server (hostname or IP address).
		• 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.
		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.
		Note Options to the boot command are **-x** (load image but do not execute) and **-v** (verbose).

Examples

Sample Output for the dir flash: Command in ROM Monitor mode

```
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:

- "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	• Quick start guide for your router • Hardware installation guide for your router
Break key sequence combinations for entering ROM monitor mode within the first 60 seconds of rebooting the router	*Standard Break Key Sequence Combinations During Password Recovery*
Upgrading the ROM monitor	*ROM Monitor Download Procedures for Cisco 2691, Cisco, 3631, Cisco 3725, and Cisco 3745 Routers* **Note** These procedures also apply to Cisco 1841 series, Cisco 2800 series, and Cisco 3800 series routers.
Using the boot image (Rx-boot) to recover or upgrade the system image	*How to Upgrade from ROMmon Using the Boot Image*
Booting and configuration register commands	*Cisco IOS Configuration Fundamentals Command Reference*
Loading and maintaining system images; rebooting	*Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*
Choosing and downloading system images	Software Center at http://www.cisco.com/kobayashi/sw-center/index.shtml
Console download (**xmodem**)	*Xmodem Console Download Procedure Using ROMmon*
Router crashes	*Troubleshooting Router Crashes* *Understanding Software-forced Crashes*
Router hangs	*Troubleshooting Router Hangs*

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.[1]	http://www.cisco.com/public/support/tac/home.shtml

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.