Configuration Register Information

The following information is found in this appendix:

Configuration Bit Meanings

Use the processor configuration register information contained in this appendix to do the following:

- Set and display the configuration register value
- Force the system into the bootstrap program
- Select a boot source and default boot filename
- Enable or disable the Break function
- Control broadcast addresses
- Set the console terminal baud rate
- Load operating software from ROM
- Enable booting from a Trivial File Transfer Protocol (TFTP) server

Table A-1 lists the meaning of each of the configuration memory bits. Following the table is a more in-depth description of each setting.

Table A-1 Configuration Register Bit Settings

Bit No.	Hex	Meaning
00–03	0x0000–0x000F	Boot field
06	0x0040	Causes the system software to ignore nonvolatile random-access memory (NVRAM) contents
07	0x0080	OEM (original equipment manufacturer) bit enabled
08	0x0100	Break disabled
10	0x0400	IP broadcast with all zeros

Table A-1 Configuration Register Bit Settings (continued)

Bit No.	Hex	Meaning
11–12	0x800–0x1000	Console line speed
13	0x2000	Boots default ROM software if initial boot fails
14	0x4000	IP broadcasts do not have network numbers
15	0x8000	Enables diagnostic messages and ignores NVRAM contents

Bits 0–3

The lowest four bits of the processor configuration register (bits 3, 2, 1, and 0) form the boot field. Table A-2 provides information about the bits settings.

Table A-2 Bits 0–3 Settings

Boot Field	Meaning
0	Stays at the system bootstrap prompt (ROM monitor) on a reload or power cycle
1	Boots the boot helper image as a system image
2	Full boot process, which loads the Cisco IOS image into Flash memory
2-F	Specifies a default filename for booting over the network from a TFTP server

The boot field specifies a number in binary. If you set the boot field value to 0, you must have a console port access to boot the operating system manually. Boot the operating system by entering the **b** command at the bootstrap prompt as follows:

```
> b [tftp] flash filename
```

Definitions of the various command options follow:

b—Boots the default system software from ROM

b flash—Boots the first file in Flash memory

b *filename [host]*—Boots over the network using TFTP

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

If you set the boot field value to a value of 2 through F, and there is a valid system boot command stored in the configuration file, the router boots the system software as directed by that value. (See Table A-3.) If you set the boot field to any other bit pattern, the router uses the resulting number to form a default boot filename for netbooting.

If there are no **boot** commands in the configuration file, the router attempts to boot the first file in system Flash memory. If no file is found in system Flash memory, the router attempts to netboot a default file with a name derived from the value of the boot field (for example, cisco2-7500). If the netboot attempt fails, the boot helper image in boot flash memory will boot up.

If **boot** commands are in the configuration file, the router software processes each **boot** command in sequence until the process is successful or the end of the list is reached. If the end of the list is reached without a file being successfully booted, the router will retry the **netboot** commands up to six times if bit 13 of the configuration register is set, otherwise it will load the operating system software available

in ROMmon. If bit 13 is not set, the router will continue to netboot images indefinitely. The default setting for bit 13 is 0. If bit 13 is set, the system boots the boot helper image found in boot flash memory without any retries.

The server creates a default filename as part of the automatic configuration processes. To form the boot filename, the server starts with Cisco and links the octal equivalent of the boot field number, a dash, and the image name. Table A-3 lists the default boot filenames or actions.

Note A **boot system configuration** command in the router configuration in NVRAM overrides the default netboot filename.

Table A-3 Default Boot Filenames

Action/File Name	Bit 3	Bit 2	Bit 1	Bit 0
Bootstrap mode	0	0	0	0
ROM software	0	0	0	1
Flash software	0	0	1	0
cisco3-< image-name1>	0	0	1	1
cisco4-<image-name2>	0	1	0	0
cisco5-<image-name3>	0	1	0	1
cisco6-<image-name4>	0	1	1	0
cisco7-<image-name5>	0	1	1	1
cisco10-<image-name6>	1	0	0	0
cisco11-<image-name7>	1	0	0	1
cisco12-<image-name8>	1	0	1	0
cisco13-<image-name9>	1	0	1	1
cisco14-<image-name10>	1	1	0	0
cisco15-<image-name11>	1	1	0	1
cisco16-<image-name12>	1	1	1	0
cisco17-<image-name13>	1	1	1	1

Bit 6

Bit 6 causes the system software to ignore nonvolatile random-access memory (NVRAM) contents.

Bit 7

Bit 7 enables the OEM bit. It disables the bootstrap messages at startup.

Bit 8

Bit 8 controls the console Break key. Setting bit 8 (the factory default) causes the processor to ignore the console Break key. Clearing bit 8 causes the processor to interpret Break as a command to force the system into the bootstrap monitor, halting normal operation. A Break can be sent in the first sixty seconds while the system reboots, regardless of the configuration settings.

Bit 10 and Bit 14

Bit 10 controls the host portion of the Internet IP broadcast address. Setting bit 10 causes the processor to use all zeros; clearing bit 10 (the factory default) causes the processor to use all ones. B it 10 interacts with bit 14, which controls the network and subnet portions of the IP broadcast address. Table A-4 shows the combined effect of bit 10 and bit 14.

Table A-4 Bit 10 and Bit 14 Settings

Bit 14	Bit 10	IP Address (<net> <host>)
Off	Off	<ones><ones>
Off	On	<zeros><zeros>
On	On	<net><zeros>
On	Off	<net><ones>

Bit 11 and Bit 12

Bit 11 and Bit 12 in the configuration register determine the baud rate of the console terminal. Table A-5 shows the bit settings for the four available baud rates. (The factory set default baud rate is 9600.)

Table A-5 Bit 11 and Bit 12 Settings

Baud	Bit 12	Bit 11
9600	0	0
4800	0	1
2400	1	1
1200	1	0

Bit 13

Bit 13 determines the server response to a bootload failure. If **boot** commands are in the configuration file, the router software processes each **boot** command in sequence until the process is successful or the end of the list is reached. If the end of the list is reached without a file being successfully booted, the router will retry the **netboot** commands up to six times if bit 13 of the configuration register is set, otherwise it will load the operating system software available in ROMmon. If bit 13 is not set, the router will continue to netboot images indefinitely. The default setting for bit 13 is 0. If bit 13 is set, the system boots the boot helper image found in boot flash memory without any retries.

Bit 15

Bit 15 enables diagnostic messages and ignores NVRAM contents.

Displaying the Configuration Register While Running Cisco IOS

The configuration register can be viewed by using the **show version** or **show hardware** command.

The following is sample output of the **show version** command.

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) RSP Software (RSP-JSV-M), Version 12.0(10r)S1, EARLY DEPLOYMENT
MAINTENANCE INTERIM SOFTWARE
TAC Support:http://www.cisco.com/cgi-bin/ibld/view.pl?i=support
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Fri 22-Mar-02 16:27 by ninahung
Image text-base:0x60010950, data-base:0x612A2000

ROM:System Bootstrap, Version 12.0(10r)S1, RELEASE SOFTWARE (fc1)

UUT uptime is 2 minutes
System returned to ROM by reload at 15:33:45 UTC Tue Mar 5 2002
System image file is "disk0:rsp-pv-mz.vip6-3.022802"

cisco RSP4+ (R5000) processor with 65536K/2072K bytes of memory.
R5000 CPU at 200Mhz, Implementation 35, Rev 2.1, 512KB L2 Cache
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
X.25 software, Version 3.0.0.
1 VIP6 RM7000B controller (2 FastEthernet).
1 GEIP controller (1 GigabitEthernet).
2 FastEthernet/IEEE 802.3 interface(s)
1 Gigabit Ethernet/IEEE 802.3 interface(s)
123K bytes of non-volatile configuration memory.

47040K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
16384K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 7.
Configuration register is 0x0
```

Displaying the Configuration Register While Running ROM Monitor

If the bootstrap prompt ">", the **o** command displays the virtual configuration register currently in effect. It includes a description of the bits. See the following sample output:

```
>o
Configuration register + 02x100 at last boot
Bit#       Configuration register option settings:
15         Diagnostic mode disabled
14         IP broadcasts do not have network numbers
13         Boot default ROM software if network boot fails
12-11      Console speed is 9600 baud
10         IP broadcasts with ones
```

```
09          Do not use secondary bootstrap
08          Break disabled
07          OEM disabled
06          Ignore configuration disabled
05          Fast boot disabled
04          Fan boot disabled
03-00       Boot to ROM monitor
```

If the prompt is “rommon1”, the **confreg** command displays the virtual configuration register currently in effect. It includes a description of the bits. See the following sample output:

```
rommon 1 > confreg

Configuration Summary
enabled are:
load rom after netboot fails
console baud: 9600
boot: the ROM Monitor

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

Setting the Configuration Register While Running Cisco IOS

The configuration register can be set in the configuration mode with the **config-register 0x**<value> command. See the following sample output:

```
Router# config t
Enter configuration commands, one per line. End with CNTRL/Z.
Router(config)#config-register 0x2142
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Setting the Configuration Register While Running ROM Monitor

If the prompt is “>”, the **or0x**<value> command sets the configuration register. See the following sample output:

```
>o/r 0x2102
>
```

If the prompt is “rommon1”, the **confreg** command sets the configuration register. It prompts the user about each bit. See the following sample output:

```
rommon 1 > confreg

Confiuration Summary
enabled are:
load rom after netboot fails
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration y/n    [n]:  y
enable  “diagnostic mode”? y/n   [n]:   n
enable   “use net in IP bcast address”? y/n  [n]:   n
disable  “use rom after netboot fails”? y/n  [n]:  n
enable   “use all zero broadcast”? y/n  [n]:  n
enable   “break/abort has effect”? y/n  [n]:  n
```

```
enable   “ignore system config info”? y/n   [n]:  n
change console baud rate? y/n  [n]:  n
change the boot characteristics? y/n   [n]:y
enter to boot:
0 = ROM Monitor
1 = the boot helper image
2 - 15 = boot system
    [0]: 2

Configuration Summary:
enabled are:
load rom after netboot fails
console baud: 9600
boot: image sepcified by the boot system commands or default to: cisco2-c7500

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

You must reset or power cycle for new config to take effect
rommon 2 >
```