APPENDIX E

Virtual Configuration Register

This appendix describes the factory default settings of the virtual configuration register, and procedures for changing those settings.

Virtual Configuration Register Settings

The router has a 16-bit virtual configuration register in nonvolatile random-access memory (NVRAM). You can use the virtual configuration register to perform the following tasks:

- Set and display the configuration register value.
- Force the router into the ROM monitor (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.

Table E-1 describes each of the virtual configuration memory bits.

Table E-1 Virtual Configuration Bit Meanings

Bit Number	Hexadecimal	Meaning
00–03	0x0000–0x000F	Boot field (see Table E-2)
06	0x0040	Causes the system software to ignore the contents of NVRAM
07	0x0080	OEM bit enabled
08	0x0100	Break disabled
10	0x0400	IP broadcast with all zeros
11–12	0x0800–0x1000	Console line speed
13	0x2000	Boots default ROM software if the network boot fails
14	0x4000	IP broadcasts do not have net numbers
15	0x8000	Enables diagnostic messages and ignores the contents of NVRAM

Changing Configuration Register Settings

You might want to modify the value in the virtual configuration register in order to:

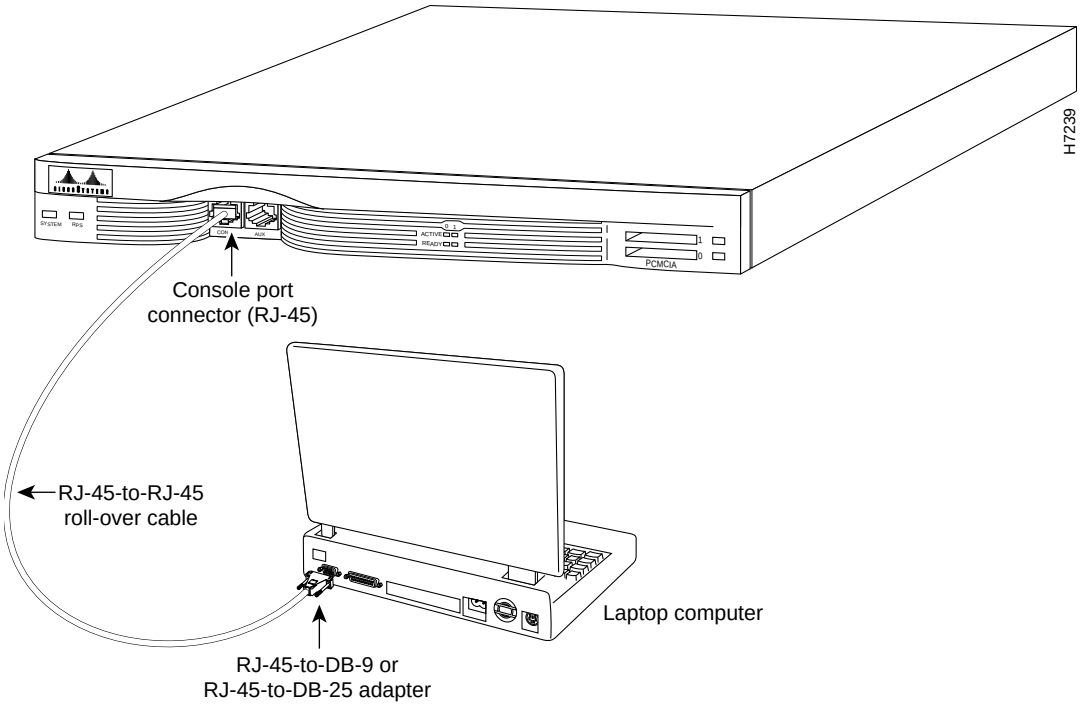
- Recover a lost password.
- Change the console data rate.
- Enable or disable the Break function.
- Manually boot the operating system using the **b** command at the ROM monitor prompt.
- Force the router to automatically boot its system image in Flash memory, or boot in accordance with any **boot system** commands stored in the router's configuration file in NVRAM.

Note If the router does not find a **boot system** command in NVRAM, it uses the configuration register value to form a filename from which to boot a default system image stored on a network server. (See Table E-3.)

You can change the virtual configuration register from either the ROM monitor or the operating system software. To change the configuration register from the ROM monitor, refer to the section “Configuration Register” in the appendix “ROM Monitor.”

Take the following steps to change the configuration register from the system software:

Step 1 Connect a console terminal using an RJ-45 rollover cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter (see figure x-x). The adapter provided is labeled Terminal. For information about cable pinouts, see the appendix “Cable Specifications.”



Step 2 Configure your terminal or terminal emulation software for 9600 baud (the default), 8 data bits, no parity, and 2 stop bits.

Step 3 Power ON the router.

Step 4 When asked if you would like to enter the initial dialog, answer **no**:

```
Would you like to enter the initial dialog? [yes]: no
```

You are now in the normal operating mode of the router.

Step 5 After a few seconds you will see the user EXEC prompt (Router>). Enter the **enable** command and your password to enter privileged mode:

```
Router> enable
Password: <password>
Router#
```

Step 6 At the privileged-mode prompt (Router#), enter the **configure term** command:

```
Router# configure term
Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
```

Step 7 Enter the **config-register** *value* command, where *value* is a hexadecimal number preceded by 0x (see Table E-2), to set the contents of the configuration register:

```
Router# config-register 0xvalue
```

Step 8 Press **Ctrl-Z** to exit configuration mode.

The new settings are saved to NVRAM, but they are not effective until the router restarts—for example, when you switch the power OFF and ON or when you enter a **reload** command from the console.

Step 9 Enter the **show version** command to display the configuration register value currently in effect and the value that will be used at the next reload. The value is shown on the last line of the display:

```
Configuration register is 0x142 (will be 0x142 at next reload)
```

Step 10 Reboot the router. The new value is effective after the router reboots.

Configuring the Boot Field

The lowest four bits of the virtual configuration register (bits 3, 2, 1, and 0) form the boot field. (See Table E-2.)

Table E-2 Explanation of Boot Field Configuration Register Bits (00–03)

Boot Field	Meaning
00	Stays at the ROM monitor on a reload or power cycle
01	Boots the boot helper image as a system image
02-F	Specifies a default netboot filename
	Enables default booting from Flash memory
	Enables boot system commands that override the default netboot filename[1]

1. Values of the boot field are 2 to 15 in the form cisco<*n*>-*model_number*, where 2 ≥n ≤ 15.

The boot field specifies a number in binary form. If you set the boot field value to 0, you must have console port access to boot the operating system manually. Refer to the **boot** command in the section "Command Descriptions" in the appendix "ROM Monitor."

If you set the boot field value to a value of 2 to 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 E-3.) If there are no boot commands in the configuration file, the router attempts to boot the first file in Flash memory.

If there are boot commands 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.

In the following example, the virtual configuration register is set to boot the router automatically from Flash memory and to ignore Break at the next reboot of the router:

```
router# configure terminal
Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
config-register 0x102
Ctrl-Z
router#
```

The router creates a default boot filename as part of the automatic configuration processes. To form the boot filename, the router starts with *cisco* and links the octal equivalent of the boot field number, a dash, and the model number. Table E-3 lists the default boot filenames or actions for the processor.

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

Table E-3 Default Boot Filenames

Action/Filename	Bit 3	Bit 2	Bit 1	Bit 0
bootstrap mode	0	0	0	0
cisco2-3620	0	0	1	0
cisco3-3620	0	0	1	1
cisco4-3620	0	1	0	0
cisco5-3620	0	1	0	1
cisco6-3620	0	1	1	0
cisco7-3620	0	1	1	1
cisco10-3620	1	0	0	0
cisco11-3620	1	0	0	1
cisco12-3620	1	0	1	0
cisco13-3620	1	0	1	1
cisco14-3620	1	1	0	0
cisco15-3620	1	1	0	1
cisco16-3620	1	1	1	0
cisco17-3620	1	1	1	1

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 router into the bootstrap monitor, halting normal operation. Break can always be sent in the first 60 seconds while the router is rebooting, regardless of the configuration settings.

Bit 10 controls the host portion of the 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. Bit 10 interacts with bit 14, which controls the network and subnet portions of the broadcast address. Table E-4 shows the combined effect of bits 10 and 14.

Table E-4 Configuration Register Settings for Broadcast Address Destination

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

Bit 13 determines the router response to a bootload failure. Setting bit 13 causes the router to load operating software from ROM after six unsuccessful attempts to load a boot file. Clearing bit 13 causes the router to continue indefinitely to attempt loading a boot file. By factory default, bit 13 is set to 0.

Bits 5, 11, and 12 of the configuration register determine the baud rate of the console terminal. Table E-5 shows the bit settings for the eight available rates. (The factory-set default baud rate is 9600.)

Table E-5 System Console Terminal Baud Rate Settings

Baud	Bit 5	Bit 12	Bit 11
115200	1	1	1
57600	1	1	0
38400	1	0	1
19200	1	0	0
9600	0	0	0
4800	0	0	1
2400	0	1	1
1200	0	1	0

Enabling Booting from Flash Memory

To enable booting from Flash memory, set bits 3, 2, 1, and 0 to a value between 2 to 15. To specify a filename to boot, enter the system software configuration command **boot system flash** [*device:*] [*partition:*] [*filename*] in the configuration file.

By specifying the device and partition in the command, you can configure the router to boot from the PCMCIA cards. If you only specify the filename, the router will be configured to boot from Flash Memory.

To enter configuration mode while in the system software image, enter the **configure** command at the enable prompt as in the following example:

```
Gateway# configure
Configuring from terminal, memory, or network [terminal]? term
Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
boot system flash filename
```

To disable Break and enable the **boot system flash** command, enter the **config-register** command with a value as follows:

```
config-reg 0x102
Ctrl-Z
```

If you set the configuration register value to 0x102, as in this example, you do not need to enter the **boot system flash** command unless there is more than one image in Flash memory.