Modifying the Switch Boot Configuration

This chapter describes how to modify the switch boot configuration, including the BOOT environment variable and the configuration register.

Note For complete syntax and usage information for the commands used in this chapter, refer to the *Command Reference* for your switch.

This chapter consists of these sections:

Understanding the Switch Boot Configuration

These sections describe how the boot configuration works on the Catalyst 5000 series Supervisor Engine III and Catalyst 4000 and 2948G series switches:

Understanding the Boot Process

The boot process on the Catalyst 5000 series Supervisor Engine III and the Catalyst 4000, 2948G, and 2926G series switches involves two software images: ROM monitor and supervisor engine system code. When the switch is powered up or reset, the ROM-monitor code is executed. Depending on the nonvolatile RAM (NVRAM) configuration, the switch either stays in ROM-monitor mode or loads the supervisor engine system code.

Two user-configurable parameters determine how the switch boots: the configuration register and the BOOT environment variable. The configuration register is described in the "Understanding the Configuration Register" section on page 17-2. The BOOT environment variable is described in the "Understanding the BOOT Environment Variable" section on page 17-3.

Understanding the ROM Monitor

The ROM monitor code executes upon switch power-up, reset, or when a fatal exception occurs. The system enters ROM-monitor mode if the switch does not find a valid system image, if the NVRAM configuration is corrupted, or if the configuration register is set to enter ROM-monitor mode. From ROM-monitor mode, you can manually load a system image from Flash memory, from a network server file, or from bootflash.

Note For complete syntax and usage information for the ROM monitor commands, refer to the *Command Reference* for your switch.

On the Catalyst 5000 and 2926G series switches, you can enter ROM-monitor mode by restarting the switch and then pressing the **Break** key during the first 60 seconds of startup. If you are connected through a terminal server, you can escape to the Telnet prompt and enter the **send break** command to enter ROM-monitor mode.

On the Catalyst 4000 and 2948G series switches, you can enter ROM-monitor mode by restarting the switch and then pressing **Control-C** during the first five seconds of startup. If you are connected through a terminal server, you can escape to the Telnet prompt and press **Control-C** to enter ROM-monitor mode.

Note The **Break** key is always enabled for 60 seconds after rebooting the system, regardless of whether the configuration-register setting has the **Break** key disabled.

The following functionality is built into the ROM monitor:

- Power-on confidence test
- Hardware initialization
- Boot capability (allows manual boot and autoboot)
- Debug utility and crash analysis
- Monitor call interface (EMT calls—the ROM monitor provides information and some functionality to the running system images via EMT calls)
- File system (the ROM monitor knows the simple file system and supports the newly developed file system through the dynamic linked file system library [MONLIB])
- Exception handling

Understanding the Configuration Register

The configuration register determines whether the switch loads an operating system image and where the system image is stored. The configuration register boot field determines if and how the ROM monitor loads a supervisor engine system image at startup. You can modify the boot field to force the switch to boot a particular system image at startup instead of using the default system image.

The lowest four bits (bits 3, 2, 1, and 0) of the 16-bit configuration register form the boot field. The default boot field value is 0x10F. The possible configuration register boot field settings are as follows:

- When the boot field equals 0000, the switch does not load a system image. Instead, it enters ROM-monitor mode from which you can enter ROM-monitor commands to manually load a system image.
- When the boot field equals 0001, the switch loads the first valid system image found in onboard Flash memory.
- When the boot field equals a value between 0010 and 1111, the switch loads the system image specified by **boot system** commands in the NVRAM configuration. It attempts to boot the image in the order in which you entered the **boot system** commands. If it cannot boot any image in the BOOT environment variable list, the switch remains in ROM-monitor mode. The exact booting sequence is defined by the ROM monitor.

The function of other bits in the configuration register are as follows:

- Bit 6 (0x0040): Causes system software to clear NVRAM contents.
- Bit 7 (0x0080): Enables OEM bit (not used).
- Bit 8 (0x0100): Disables break.
- Bit 9 (0x0200): Uses secondary bootstrap (not used by the ROM monitor).
- Bit 10 (0x0400): Provides IP broadcast with all zeros (not used).
- Bits 11/12 (0x0800/0x1000): On the Catalyst 5000 and 2926G series switches, provide console line speed: 0/0=9600, 0/1=1200, 1/0=4800, 1/1=2400 (Default is 9600). On the Catalyst 4000 and 2948G series switches, these bits are always set to 0/0 (9600 baud).
- Bit 13 (0x2000): Boots default Flash software if network boot fails (not used).
- Bit 14 (0x4000): IP broadcasts do not have network numbers (not used).
- Bit 15 (0x8000): Enables diagnostic messages and ignores NVRAM contents (not used).

Understanding the BOOT Environment Variable

The BOOT environment variable specifies a list of image files on various devices from which the switch can boot at startup.

You can add several images to the BOOT environment variable to provide a fail-safe boot configuration. If the first file fails to boot the switch, subsequent images specified in the BOOT variable are tried until the switch boots or there are no additional images to attempt to boot. If there is no valid image to boot, the system enters ROM-monitor mode where you can manually specify an image to boot.

The system stores and executes images in the order in which you added them to the BOOT variable. If you want to change the order in which images are tried at startup, you can either prepend and clear images from the BOOT variable to attain the desired order or you can clear the entire BOOT environment variable and then redefine the list in the desired order.

Default Switch Boot Configuration

Table 17-1 shows the default switch boot configuration.

Table 17-1 Default Switch Boot Configuration

Feature	Default Configuration
Configuration register value	0x10f
Boot method	System boots from the image specified in the BOOT environment variable
ROM monitor console port baud rate	9600 baud[1]
ignore-config parameter	Disabled
BOOT environment variable	Empty

1 On the Catalyst 4000 and 2948G series switches, the ROM monitor console port baud rate is always 9600 baud.

Setting the Configuration Register and BOOT Environment Variable

Note Configuration register and BOOT environment variable settings are not copied automatically to a redundant supervisor engine (if present). You must set these parameters separately for each supervisor engine in the switch.

The following sections describe how to modify the configuration register and BOOT environment variable on the Catalyst 5000 series Supervisor Engine III and Catalyst 4000, 2948G, and 2926G series switches:

Setting the Boot Field in the Configuration Register

You can determine the boot method the switch will use at the next startup by setting the boot field in the configuration register. This command affects only the configuration register bits that control the boot field and leaves the remaining bits unaltered. The following boot methods are supported:

- ROM monitor—Use the **rommon** keyword to force the switch to remain in ROM-monitor mode at startup
- Bootflash—Use the **bootflash** keyword to cause the switch to boot from the first image stored in the onboard Flash
- System—Use the **system** keyword to boot from the image specified in the BOOT environment variable (the default)

Note We recommend that you use only the **rommon** and **system** options to the **set boot config-register boot** command.

To set the configuration register boot field, perform this task in privileged mode:

Task	Command
Specify the boot field in the configuration register.	**set boot config-register boot** {**rommon** | **bootflash** | **system**} [*mod_num*]

This example shows how to force the switch to enter ROM-monitor mode at the next startup:

```
Console> (enable) set boot config-register boot rommon
Configuration register is 0x140
ignore-config: enabled
console baud: 9600
boot: the ROM monitor
Console> (enable)
```

Setting the ROM-Monitor Console Port Baud Rate

On the Catalyst 5000 and 2926G series switches, you can change the console port baud rate used by the ROM monitor. The new baud rate is used the next time the switch is restarted. This command affects only the configuration register bits that control the baud rate and leaves the remaining bits unaltered.

On the Catalyst 4000 and 2948G series switches, you cannot change the ROM monitor console port baud rate; it is always set to 9600 baud.

Note The baud rate specified in the configuration register is used by the ROM monitor only and is different from the baud rate specified by the **set system baud** command.

To change the ROM-monitor console port baud rate in the configuration register, perform this task in privileged mode:

Task	Command
Change the ROM-monitor console port baud rate in the configuration register.	**set boot config-register baud** {**1200** | **2400** | **4800** | **9600**} [*mod_num*]

This example shows how to change the ROM-monitor console port baud rate in the configuration register to 2400:

```
Console> (enable) set boot config-register baud 2400
Configuration register is 0x190f
ignore-config: disabled
console baud: 2400
boot: image specified by the boot system commands
Console> (enable)
```

Setting the Switch to Ignore the NVRAM Configuration

You can cause the system software to ignore the configuration information stored in NVRAM the next time the switch is restarted. This command affects only the configuration register bits that control whether the switch ignores the NVRAM configuration and leaves the remaining bits unaltered. This command affects the next system restart only.

Caution Enabling the **ignore-config** parameter is the same as entering the **clear config all** command; that is, it clears the entire configuration stored in NVRAM the next time the switch is restarted.

To set the switch to ignore the NVRAM configuration at the next startup, perform this task in privileged mode:

Task	Command
Set the switch to ignore the contents of NVRAM at startup.	**set boot config-register ignore-config enable**

This example shows how to set the switch to ignore the NVRAM configuration at the next startup:

```
Console> (enable) set boot config-register ignore-config enable
Configuration register is 0x14f
ignore-config: enabled
console baud: 9600
boot: image specified by the boot system commands
Console> (enable)
```

Setting the Complete Configuration Register Value

To set the entire configuration register value, perform this task in privileged mode:

Task	Command
Set the configuration register.	**set boot config-register 0x***value* [*mod_num*]

This example shows how to set the configuration register value to 0x90f:

```
Console> (enable) set boot config-register 0x90f
Configuration register is 0x90f
ignore-config: disabled
console baud: 4800
boot: image specified by the boot system commands
Console> (enable)
```

Setting the BOOT Environment Variable

To set the BOOT environment variable, perform this task in privileged mode:

Task	Command
Specify a system image to add to the BOOT environment variable.	**set boot system flash** *device:*[*filename*] [**prepend**] [*mod_num*]

This example shows how to add system images to the BOOT environment variable:

```
Console> (enable) set boot system flash bootflash:cat5000-sup3.3-2-1b.bin
BOOT variable = bootflash:cat5000-sup3.3-2-1b.bin,1;
Console> (enable) set boot system flash bootflash:cat5000-sup3.4-1-2.bin
BOOT variable = bootflash:cat5000-sup3.3-2-1b.bin,1;bootflash:cat5000-sup3.4-1
-2.bin,1;
Console> (enable) set boot system flash slot0:cat5000-sup3.4-2-1.bin prepend
BOOT variable = slot0:cat5000-sup3.4-2-1.bin,1;bootflash:cat5000-sup3.3-2-1b.
bin,1;bootflash:cat5000-sup3.4-1-2.bin,1;
Console> (enable)
```

Displaying the Switch Boot Configuration

To display the current configuration register and BOOT environment variable settings, perform this task:

Task	Command
Display the current configuration register and BOOT environment variable settings.	**show boot** [*mod_num*]

This example shows how to display the current configuration register and BOOT environment variable settings:

```
Console> (enable) show boot
BOOT variable = slot0:cat5000-sup3.4-2-1.bin,1;bootflash:cat5000-sup3.3-2-1b.
bin,1;bootflash:cat5000-sup3.4-1-2.bin,1;

Configuration register is 0x10f
ignore-config: disabled
console baud: 9600
boot: image specified by the boot system commands

Console> (enable)
```

Clearing the BOOT Environment Variable Settings

To clear entries from the BOOT environment variable, perform one of these tasks in privileged mode:

Task	Command
• Clear a specific image from the BOOT environment variable.	**clear boot system flash** *device:*[*filename*] [*mod_num*]
• Clear the entire BOOT environment variable.	**clear boot system all** [*mod_num*]

This example shows how to clear a specific entry from the BOOT environment variable:

```
Console> (enable) clear boot system flash bootflash:cat5000-sup3.3-2-1b.bin
BOOT variable = slot0:cat5000-sup3.4-2-1.bin,1;bootflash:cat5000-sup3.4-1-2.bin,1;
Console> (enable)
```

This example shows how to clear the entire BOOT environment variable:

```
Console> (enable) clear boot system all
BOOT variable =
Console> (enable)
```