



## Before You Begin

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This chapter prepares you to configure switches from the CLI. It also lists the information you need to have before you begin, and it describes the CLI command modes.

This chapter includes the following sections:

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# About the Switch Prompt

If you are connected to the console port when the switch boots up, you see the output show in [Figure 2-1](#):



## Note

Refer to the *Cisco MDS 9200 Series Hardware Installation Guide* or the *Cisco MDS 9500 Series Hardware Installation Guide* for installation and connection instructions.

Once the switch is powered on successfully, you see the default switch prompt (`switch#`). You can perform embedded CLI operations, access command history, and use command parsing functions at this prompt. The switch gathers the command string upon detecting an **Enter** (CR) and accepts commands from a terminal.

**Figure 2-1 Output When a Switch Boots Up**

```
Auto booting bootflash:/boot-279 bootflash:/system_image;...
Booting kickstart image:bootflash:/boot-279....
.....Image verification OK

Starting kernel...
INIT: version 2.78 booting
Checking all filesystems..... done.
Loading system software
Uncompressing system image: bootflash:/system_image
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
INIT: Entering runlevel: 3

<<<<<<SAN OS bootup log messages>>>>>>

      ---- Basic System Configuration Dialog ----

This setup utility will guide you through the basic configuration of
the system. Use ctrl-c to abort configuration dialog at any prompt.

Basic management setup configures only enough connectivity for
management of the system.

Would you like to enter the basic configuration dialog (yes/no): yes

<<<<<<after configuration>>>>>>

switch login:
```

## About the CLI Command Modes

Switches in the Cisco MDS 9000 Family have two main command modes—user EXEC mode and configuration mode. The commands available to you depend on the mode you are in. To obtain a list of available commands in either mode, type a question mark (?) at the system prompt.

Table 2-1 lists and describes the two commonly used modes, how to enter the modes, and the resulting system prompts. The system prompt helps you identify which mode you are in and hence, which commands are available to you.

**Table 2-1** Frequently Used Switch Command Modes

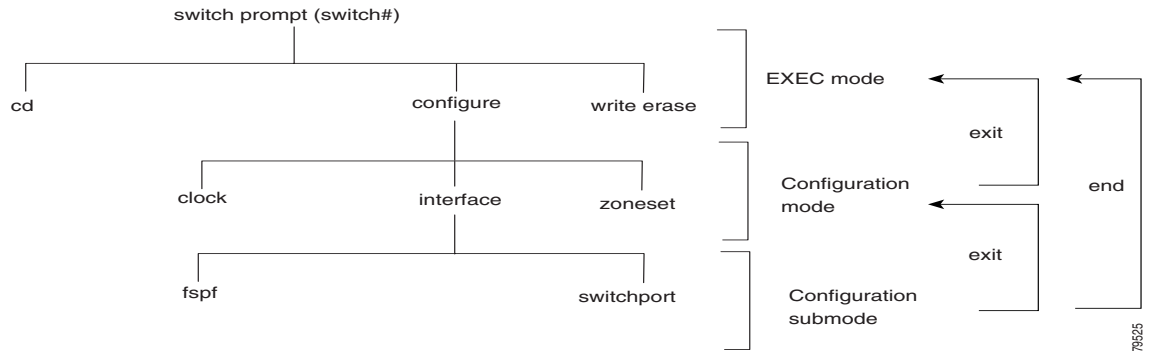
Mode	Description of Use	How to Access	Prompt
EXEC	Enables you to temporarily change terminal settings, perform basic tests, and display system information.  <b>Note</b> Changes made in this mode are generally not saved across system resets.	At the switch prompt, enter the required EXEC mode command.	switch#
Configuration mode	Enables you to configure features that affect the system as a whole.  <b>Note</b> Changes made in this mode are saved across system resets if you save your configuration. See the “Saving a Configuration” section on page 2-12.	From EXEC mode, enter the <b>config terminal</b> command.	switch(config)#

You can abbreviate commands and keywords by entering just enough characters to make the command unique from other commands. For example, you can abbreviate the **config terminal** command to **conf t**.

# Understanding CLI Command Hierarchy

The CLI commands are organized hierarchically, with commands that perform similar functions grouped under the same level. For example, all commands that display information about the system, configuration, or hardware are grouped under the **show** command, and all commands that allow you to configure the switch are grouped under the **config terminal** command. Figure 2-2 illustrates a portion of the **config terminal** command hierarchy.

**Figure 2-2 CLI Command Hierarchy Example**



To execute a command, you enter the command by starting at the top level of the hierarchy. For example, to configure a Fibre Channel interface, use the **config terminal** command. Once you are in configuration mode, issue the **interface** command. When you are in the interface submode, you can query the available commands there.

The following example shows how to query the available commands in the interface submode:

```

switch# config t
Enter configuration commands, one per line. End with CNTL/Z.
switch(config)# interface fc1/1
switch(config-if)# ?
Interface configuration commands:
  channel-group  Add to/remove from a port-channel
  exit           Exit from this submode
  fcdomain       Enter the interface submode
  fspf           To configure FSPF related parameters
  no             Negate a command or set its defaults
  shutdown       Enable/disable an interface
  switchport     Configure switchport parameters
  
```

## EXEC Mode Options

When you start a session on the switch, you begin in EXEC mode. Based on the role or group to which you belong, you have access to limited commands or to all commands (see the [“Role-Based Authorization” section on page 14-3](#)). From the EXEC mode, you can enter configuration mode. Most of the EXEC commands are one-time commands, such as **show** commands, which display the current configuration status. Here is a list of EXEC mode commands:

```
switch# ?
Exec Commands:
  attach      Connect to a specific linecard
  callhome    Callhome commands
  cd          Change current directory
  clear       Reset functions
  clock       Manage the system clock
  config      Enter configuration mode
  copy        Copy from one file to another
  debug       Debugging functions
  delete      Remove files
  dir         Directory listing for files
  discover    Discover information
  exit        Exit from the EXEC
  fcping      Ping an N-Port
  fctrace     Trace the route for an N-Port.
  find        Find a file below the current directory
  format      Format disks
  install     Upgrade software
  load        Load system image
  mkdir       Create new directory
  move        Move files
  no          Disable debugging functions
  ping        Send echo messages
  purge       Deletes unused data
  pwd         View current directory
  reload      Reboot the entire box
  rmdir       Remove existing directory
  run-script  Run shell scripts
  send        Send message to all the open sessions
  setup       Run the basic SETUP command facility
  show        Show running system information
  sleep       Sleep for the specified number of seconds
  system      System management commands
  tail        Display the last part of a file
  telnet      Telnet to another system
  terminal    Set terminal line parameters
  test        Test command
  traceroute  Trace route to destination
  undebg      Disable Debugging functions (See also debug)
  write       Write current configuration
  zone        Execute Zone Server commands
```

## Configuration Mode

Configuration mode allows you to make changes to the existing configuration. When you save the configuration, these commands are preserved across switch reboots. Once you are in configuration mode, you can enter interface configuration mode, zone configuration mode, and a variety of protocol-specific modes. Configuration mode is the starting point for all configuration commands. When you are in configuration mode, the switch expects configuration commands from the user.

The following example shows output from the **config terminal** command:

```
switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
switch(config)#
```

## Configuration Mode Commands and Submodes

The following is a list of configuration mode commands:

```
switch# config t
Enter configuration commands, one per line. End with CNTL/Z.
switch(config)# ?
Configure commands:
  aaa                Configure AAA
  arp                [no] remove an entry from the ARP cache
  boot              Configure boot variables
  callhome          Enter the callhome configuration mode
  clock             Configure time-of-day clock
  end              Exit from configure mode
  exit             Exit from configure mode
  fcalias           Fcalias configuration commands
  fcanalyzer        Configure cisco fabric analyzer
  fcc               Configure FC Congestion Control
  fcdomain          Enter the fcdomain configuration mode
  fcdroplattency   Configure switch or network latency
  fcflow            Configure fcflow
  fcinterop         Interop commands.
  fcns              Name server configuration
  fcroute           Configure FC routes
  fcs               Configure Fabric Config Server
  fctimer           Configure fibre channel timers
  fspf              Configure fspf
  in-order-guarantee Set in-order delivery guarantee
  interface         Select an interface to configure
  ip                Configure IP features
  line              Configure a terminal line
  logging           Modify message logging facilities
  no                Negate a command or set its defaults
  ntp               NTP Configuration
  power             Configure power supply
  poweroff          Poweroff a module in the switch
  qos               Configure priority of FC control frames
  radius-server     Configure RADIUS related parameters
  role              Configure roles
  rscn              Config commands for RSCN
  snmp-server       Configure snmp server
  span              Enter SPAN configuration mode
  ssh               Configure SSH parameters
  switchname        Configure system's network name
  system            System config command
  telnet            Enable telnet
  trunk             Configure Switch wide trunk protocol
```

username	Configure user information.
vsan	Enter the vsan configuration mode
wwn	Set secondary base MAC addr and range for additional WWNs
zone	Zone configuration commands
zoneset	Zoneset configuration commands

Configuration mode, also known as terminal configuration mode, has several submodes. Each of these submodes places you deeper in the prompt hierarchy. When you type **exit**, the switch backs out one level and returns you to the previous level. When you type **end**, the switch backs out to the user EXEC level. You can also type **Ctrl-Z** in configuration mode as an alternative to typing **end**.

**Note**

When in configuration mode, you can alternatively enter

- **Ctrl-Z** instead of the **end** command, and
- **Ctrl-G** instead of the **exit** command

You can execute an EXEC mode command from a configuration mode or submode prompt. You can issue this command from any submode within the configuration mode. When in configuration mode (or in any submode), enter the **do** command along with the required EXEC mode command. The entered command is executed at the EXEC level and the prompt resumes its current mode level.

```
switch(config)# do terminal session-timeout 0
switch(config)#
```

In this example, **terminal session-timeout** is an EXEC mode command—you are issuing an EXEC mode command using the configuration mode **do** command.

The **do** command applies to all EXEC mode commands other than the **end** and **exit** commands. You can also use the help (?) and command completion (tab) features for EXEC commands when issuing a **do** command along with the EXEC command.

Table 2-2 lists some useful command keys that can be used in both EXEC and configuration modes:

**Table 2-2 Useful Command Key Description**

Command	Description
<b>Ctrl-P</b>	Up history
<b>Ctrl-N</b>	Down history
<b>Ctrl-X-H</b>	List history
<b>Alt-P</b>	History search backwards <b>Note</b> The difference between <b>Tab</b> completion and <b>Alt-P</b> or <b>Alt-N</b> is that <b>TAB</b> completes the current word while <b>Alt-P</b> and <b>Alt-N</b> completes a previously-entered command.
<b>Alt-N</b>	History search forwards
<b>Ctrl-G</b>	Exit
<b>Ctrl-Z</b>	End
<b>Ctrl-L</b>	Clear screen

Table 2-3 displays the commonly used configuration submodes.

**Table 2-3 Submodes Within the Configuration Mode**

Submode Name	From Configuration Mode Enter	Submode Prompt	Configured Information
Call Home	<b>callhome</b>	switch(config-callhome)#	Contact, destination, and e-mail
FCS Registration	<b>fcs register</b>	switch(config-fcs-register)#	FCS attribute registration
	From FCS registration submode: <b>platform name name vsan vsan-id</b>	switch(config-fcs-register-attr)#	Platform name and VSAN ID association
Fibre Channel alias	<b>fcalias name name vsan vsan-id</b>	switch(config-fcalias)#	Alias member
FSPF	<b>fspf config vsan vsan-id</b>	switch(config-(fspf-config))#	Static SPF computation, hold time, and autonomous region
Interface configuration	<b>interface type slot/port</b>	switch(config-if)#	Channel groups, Fibre Channel domains, FSPF parameters, switch port trunk and beacon information, and IP address
	From the VSAN or mgmt0 (management) interface configuration submode: <b>vrrp number</b>	switch(config-if-vrrp)#	Virtual router (see <a href="#">“Creating or Removing a Virtual Router”</a> section on page 17-19)
Line console	<b>line console</b>	switch(config-console)#	Primary terminal console
VTY	<b>line vty</b>	switch(config-line)#	Virtual terminal line
Role	<b>role name</b>	switch(config-role)#	Rule
SPAN	<b>span session number</b>	switch(config-span)#	SPAN source, destination, and suspend session information
VSAN database	<b>vsan database</b>	switch(config-vsan-db)#	VSAN database
Zone	<b>zone name string vsan vsan-id</b>	switch(config-zone)#	Zone member
Zone set	<b>zoneset name name vsan vsan-id</b>	switch(config-zoneset)#	Zone set member



# Navigating Through CLI Commands

To redisplay a command you previously entered, press the **Up Arrow** key. You can continue to press the **Up Arrow** key to see more previously issued commands. Similarly, you can press the **Down Arrow**, **Right Arrow**, **Left Arrow**, and **Delete** keys to navigate through the command history and to modify an existing command string.

## Getting Help

In any command mode, you can get a list of available commands by entering a question mark (?).

```
switch# ?
```

To obtain a list of commands that begin with a particular character sequence, type in those characters followed immediately by the question mark (?). Do not include a space.

```
switch# co?
configure copy
```

To list keywords or arguments, enter a question mark in place of a keyword or argument. Include a space before the question mark. This form of help is called command syntax help, because it reminds you which keywords or arguments are applicable based on the commands, keywords, and arguments you have already entered.

```
switch# config ?
terminal Configure the system from the terminal
```



**Tip**

If you are having trouble entering a command, check the system prompt and enter the question mark (?) for a list of available commands. You might be in the wrong command mode or using incorrect syntax.

## Command Completion

In any command mode, you can begin a particular command sequence and immediately press the **Tab** key to complete the rest of the command.

```
switch (config)# ro<Tab>
switch (config)# role <Tab>
switch (config)# role name
```

This form of help is called command completion, because it completes a word for you. If several options are available for the typed letters, all options that match those letters are presented:

```
switch(config)# fc<Tab>
fcalias          fcdomain          fcs
fcanalyzer       fcdroplacency    fcns              fctimer
fcc              fcinterop        fcroute
switch(config)# fcd<Tab>
fcdomain         fcdroplacency
switch(config)# fcd<Tab>
switch(config)# fcdomain
```

## Using the no and Default Forms of Commands

You can issue the **no** form of any command to perform the following actions:

- Undo a wrongly issued command.

If you issue the **zone member** command, you can undo the results:

```
switch(config)# zone name test vsan 1
switch(config-zone)# member pwnn 12:12:12:12:12:12:12:12
switch(config-zone)# no member pwnn 12:12:12:12:12:12:12:12
WARNING: Zone is empty. Deleting zone test. Exit the submode.
switch(config-zone)#
```

- Delete a created facility

If you want to delete a zone that you created:

```
switch(config)# zone name test vsan 1
switch(config-zone)# exit
switch(config)# no zone name test vsan 1
switch(config)#
```

You cannot delete a zone facility called test while residing in it. You must first exit the zone submode and return to configuration mode.

## Entering CLI Commands

You can configure the software in one of two ways:

- You can create the configuration for the switch interactively by issuing commands at the CLI prompt.
- You can create an ASCII file containing a switch configuration and then load this file on the required system. You can then use the CLI to edit and activate the file (see the [“Working with Configuration Files”](#) section on page 3-23).

## Viewing a Configuration

You can view the ASCII form of the configuration file when required. To view the current configuration tree from the EXEC prompt, issue the **show running-config** command. If the running configuration is different from the startup configuration, issue the **show startup-config** command to view the ASCII version of the current startup configuration that was used to boot the switch.

You can gather specific information on the entire switch configuration by issuing the relevant **show** commands. Available **show** commands for each feature are listed at the end of each chapter. Examples 2-1 to 2-3 display a few **show** command examples.

### Example 2-1 Displays the Specified Interface

```
switch# show interface fc1/1
fc1/1 is up
  Hardware is Fibre Channel, 20:01:ac:16:5e:4a:00:00
  vsan is 1
  Port mode is E
  Speed is 1 Gbps
  Beacon is turned off
  FCID is 0x0b0100
```

```

0 frames input, 0 bytes, 0 discards
0 runts, 0 jabber, 0 too long, 0 too short
0 input errors, 0 CRC, 0 invalid transmission words
0 address id, 0 delimiter
0 EOF abort, 0 fragmented, 0 unknown class
0 frames output, 0 bytes, 0 discards
Received 0 OLS, 0 LRR, 0 NOS, 0 loop inits
Transmitted 0 OLS, 0 LRR, 0 NOS, 0 loop inits

```

### Example 2-2 Displays the Software and Hardware Version

```

switch# show version
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2003 by Cisco Systems, Inc. All rights reserved.
The copyright for certain works contained herein are owned by
Andiamo Systems, Inc. and/or other third parties and are used and
distributed under license.

Software
  BIOS:      version 1.0.3
  loader:    version error [last 1.0(1)]
  kickstart: version 1.1(1) [build 1.1(0.94)] [gdb]
  system:    version 1.1(1) [build 1.1(0.94)] [gdb]

  BIOS compile time:      11/18/02
  kickstart image file is: bootflash:/bootimage
  kickstart compile time: 2/12/2003 11:00:00
  system image file is:   isanimage
  system compile time:    2/12/2003 12:00:00

Hardware
  RAM 1027628 kB

  bootflash: 1000944 blocks (block size 512b)
  slot0:      0 blocks (block size 512b)

172.22.90.171 uptime is 0 days 2 hours 48 minute(s) 26 second(s)

Last reset at 669882 usecs after Thu Feb 13 07:20:41 2003
Reason: Reset Requested by CLI command reload
System version: 1.0(1)

```

### Example 2-3 Displays the Running Configuration

```

switch# show running-config
Building Configuration ...
  interface fc1/1
  interface fc1/2
  interface fc1/3
  interface fc1/4
  interface mgmt0
ip address 172.22.95.112 255.255.255.0
no shutdown
vsan database
boot system bootflash:system-237; sup-1
boot kickstart bootflash:boot-237 sup-1
callhome
ip default-gateway 172.22.95.1
switchname switch
trunk protocol enable
username admin password 5 /AFDAMD4B2xK2 role network-admin

```

## Saving a Configuration

To save the configuration, enter the **copy running-config startup-config** command from the EXEC mode prompt to save the new configuration into nonvolatile storage. Once this command is issued, the running and the startup copies of the configuration are identical.

See the “[Copying Files](#)” section on page 3-27.

## Clearing a Configuration

To clear a startup configuration, enter the **write erase** command from the EXEC mode prompt. Once this command is issued, the switch’s startup configuration reverts to factory defaults. The running configuration is not affected. The **write erase** command erases the entire startup configuration with the exception of any configuration that affects the loader functionality.

The **write erase boot** command only erases the configuration that affects the loader functionality. The loader functionality configuration includes the boot variables and the mgmt0 IP configuration information (IP address, netmask and default gateway).

```
switch# write erase boot
```

This command will erase the boot variables and the ip configuration of interface mgmt 0

## Displaying Users

The **show users** command displays all users currently accessing the switch.

```
switch# show users
admin pts/7 Jan 12 20:56 (10.77.202.149)
admin pts/9 Jan 12 23:29 (modena.cisco.com)
admin pts/11 Jan 13 01:53 (dhcp-171-71-49-49.cisco.com)
```

## Sending Messages to Users

The **send** command sends a message to all active CLI users currently using the switch. This message is restricted to 80 alphanumeric characters with spaces.

This example sends a warning message to all active users about the switch being shut down.

```
switch# send Shutting down the system in 2 minutes. Please log off.
```

```
Broadcast Message from admin@excal-112
(/dev/pts/3) at 16:50 ...
```

```
Shutting down the system in 2 minutes. Please log off.
```

## Using the ping Command

The **ping** command verifies the connectivity of a remote host or server by sending echo messages.

The syntax for this command is **ping** *<host or ip address>*

```
switch# ping 198.133.219.25
PING 198.133.219.25 (198.133.219.25) 56(84) bytes of data.
64 bytes from 198.133.219.25: icmp_seq=1 ttl=245 time=0.856 ms
64 bytes from 198.133.219.25: icmp_seq=2 ttl=245 time=1.02 ms

--- 198.133.219.25 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 999ms
rtt min/avg/max/mdev = 0.856/0.941/1.027/0.090 ms
```

To abnormally terminate a ping session, type the **Ctrl-C** escape sequence

## Using traceroute

The **traceroute** command prints the routes taken by a specified host or IP address.

The syntax for this command is **traceroute** *<host or ip address>*

```
switch# traceroute www.cisco.com
Tracing route to www.cisco.com [198.133.219.25] 30 hops max, 38 byte packets
 1  bras3-10.pltnca.sbcglobal.net [151.164.184.79] 30 ms 30 ms 20 ms
 2  dist2-vlan50.pltn13.pbi.net [64.164.97.67] 20 ms 20 ms 30 ms
 3  bb2-g1-1.pltn13.pbi.net [67.116.251.194] 20 ms 20 ms 20 ms
 4  bb1-p12-0.pltn13.pbi.net [151.164.40.17] 20 ms 21 ms 20 ms
 5  bb2-p13-0.sntc01.pbi.net [151.164.191.65] 20 ms 20 ms 30 ms
 6  ex1-p3-0.egsjca.sbcglobal.net [64.161.1.54] 20 ms 20 ms 30 ms
 7  s1-st20-sj-0-0.sprintlink.net [144.223.242.81] 20 ms 20 ms 30 ms
 8  s1-bb25-sj-10-0.sprintlink.net [144.232.20.62] 20 ms 30 ms 20 ms
 9  s1-gw11-sj-10-0.sprintlink.net [144.232.3.134] 70 ms 30 ms 30 ms
10  s1-ciscopsn2-11-0-0.sprintlink.net [144.228.44.14] 20 ms 30 ms 20 ms
11  sjce-dmzbb-gw1.cisco.com [128.107.239.89] 20 ms 30 ms 30 ms
12  sjck-dmzdc-gw1.cisco.com [128.107.224.69] 20 ms 30 ms 20 ms
13  www.cisco.com (198.133.219.25) 2.496 ms * 2.135 ms
```

To abnormally terminate a traceroute session, enter **Ctrl-C**.

## Setting the Switch's Shell Timeout

Use the **exec-timeout** command in configuration mode to configure the lifetime of all terminal sessions on that switch. When the time limit configured by this command is exceeded, the shell exits and closes that session.

The syntax for this command from is **exec-timeout** *minutes*

The default is 30 minutes. You can configure different timeout values for a console or a virtual terminal line (VTY) session. You can set the **exec-timeout** value to 0 to disable this feature so the session remains active until you exit the switch. This change is saved in the configuration file.

- From the console:

```
switch(config)# line console
switch(config-console)# exec-timeout 60
```

Specifies the current console shell timeout to be 60 minutes.

- From a VTY session (Telnet or SSH):

```
switch(config)# line vty
switch(config-line)# exec-timeout 60
```

Specifies the current console shell timeout to be 60 minutes.

## Displaying VTY Sessions

Use the **show line** command to display all configured VTY sessions:

```
switch# show line
line Console:
  Speed:          38400 bauds
  Databits:       8 bits per byte
  Stopbits:       1 bit(s)
  Parity:         none
line Aux:
  Speed:          9600 bauds
  Databits:       8 bits per byte
  Stopbits:       1 bit(s)
  Parity:         none
```

## Clearing VTY Sessions

Use the **clear line** command to close a specified VTY session:

```
switch# clear line Aux
```

## Setting the Switch's Terminal Timeout

Use the **terminal session-timeout** command in EXEC mode to configure the automatic logout time for the current terminal session on that switch. When the time limit configured by this command is exceeded, the switch closes that session and exits.

The syntax for this command from is **terminal session-timeout *minutes***

The default is 30 minutes. You can set the **terminal session-timeout** value to 0 to disable this feature so the terminal remains active until you choose to exit the switch. This change is not saved in the configuration file.

```
switch# terminal session-timeout 600
```

Specifies the terminal timeout to be 600 minutes for the current session.

## Setting the Switch's Terminal Type

Use the **terminal terminal-type** command in EXEC mode to specify the terminal type for a switch:

The syntax for this command is **terminal terminal-type *terminal-type***

```
switch# terminal terminal-type vt100
```

Specifies the terminal type. The *terminal-type* string is restricted to 80 characters and must be a valid type (for example vt100 or xterm). If a Telnet or SSH session specifies an unknown terminal type, the switch uses the vt100 terminal by default.

## Setting the Switch's Terminal Length

To set the terminal screen length for the current session, use the **terminal length** command in EXEC mode. This command is specific to only the console port. Telnet and SSH sessions set the length automatically.

The syntax for this command is **terminal length** *lines*

```
switch# terminal length 20
```

Sets the screen length for the current session to 20 lines for the current terminal session. The default is 24 lines.

## Setting the Switch's Terminal Width

To set the terminal screen width for the current session, use the **terminal width** command in EXEC mode. This command is specific to only the console port. Telnet and SSH sessions set the width automatically.

The syntax for this command is **terminal width** *columns*

```
switch# terminal width 86
```

Sets the screen length for the current session to 86 columns for the current terminal session. The default is 80 columns.

## Displaying Terminal Settings

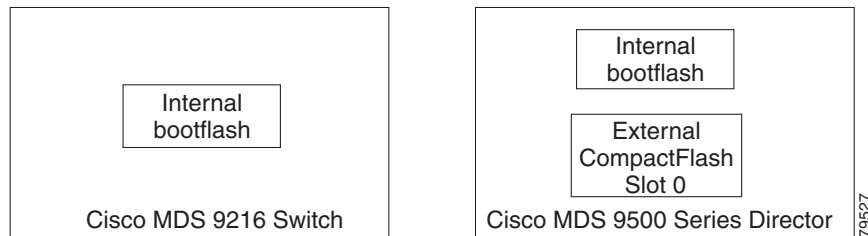
The show terminal command displays the terminal settings for the current session:

```
switch# show terminal
TTY: Type: "vt100"
Length: 24 lines, Width: 80 columns
Session Timeout: 525600 minutes
```

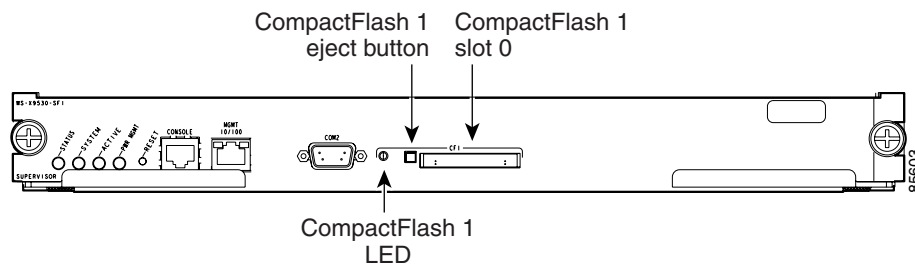
## About Flash Devices

Every switch in the Cisco MDS 9000 Family contains one internal bootflash (see [Figure 2-3](#)). The Cisco MDS 9500 Series additionally contains one external CompactFlash called slot0 (see [Figure 2-3](#) and [Figure 2-4](#)).

**Figure 2-3 Flash Devices in the Cisco MDS 9000 Supervisor Module**



**Figure 2-4 External CompactFlash in the Cisco MDS 9000 Supervisor Module**



### Internal bootflash:

All switches in the Cisco MDS 9000 Family have one internal bootflash: that resides in the supervisor or switching module. You have access to two directories within the internal bootflash: file system.

- The volatile: directory which provides temporary storage, and is also the default. Files in temporary storage (volatile:) are erased when the switch reboots.
- The bootflash (nonvolatile storage): directory which provides permanent storage. The files in bootflash are preserved through reboots and power outages.

### External CompactFlash (Slot0)

Cisco MDS 9500 Series directors contain an additional external CompactFlash called slot0:

The external CompactFlash, an optional device for MDS 9500 Series directors, can be used for storing software images, logs, and core dumps.



# Formatting Flash Disks and File Systems

By formatting a flash disk or a file system, you are essentially clearing out the contents of the disk or the file system and restoring it to its factory-shipped state (see the “[About Flash Devices](#)” section on page 2-16 and “[Using the File System](#)” section on page 2-18 for additional information).

## Initializing bootflash:

When a switch is shipped, the **init system** command is already performed and you do not need to issue it again. Initializing the switch resets the entire internal disk and erases all data in the bootflash: partition. The internal disk is composed of several file systems with bootflash: being one of them. All files in bootflash: are erased and you must download the system and kickstart images again. If you issue an **init system** command at any time, you don't have to format the bootflash: again since bootflash: is automatically formatted.

**Note**

---

The **init system** command also installs a new loader from the existing (running) kickstart image. You can access this command from the `switch(boot)#` prompt (see [Chapter 5, “Software Images”](#)).

---

If bootflash: is found corrupted during a boot sequence, you will see the following message:

```
ERROR:bootflash: has unrecoverable error; please do "format bootflash:"
```

Use the **format bootflash:** command to only format the bootflash: file system. You can access the format bootflash: command from either the `switch#` or the `switch(boot)#` prompts.

If you issue the **format bootflash:** command, you need to download the kickstart and system images again.

## Formatting Slot0:

Be sure to format an external CompactFlash device before using it to save files or images.

You can verify if the external CompactFlash device is formatted by inserting it into slot0: and issuing the **dir slot0:** command.

- If the external CompactFlash device is already formatted, you can see file system usage information (along with any existing files).
- If the external CompactFlash device is unformatted (corrupted), you will see the following message:

```
Device unavailable
```

In this case, you need to format the CompactFlash device using the **format slot0:** command.

**Note**

---

The slot0: file system cannot be accessed from the standby the `loader>` prompt or the `switch(boot)#` prompt, if the disk is inserted after booting the switch.

---

# Using the File System

The switch provides the following useful commands to help you manage software image files and configuration files:

- [Setting the Current Directory, page 2-18](#)
- [Displaying the Current Directory, page 2-18](#)
- [Listing the Files in a Directory, page 2-19](#)
- [Creating a New Directory, page 2-19](#)
- [Deleting an Existing Directory, page 2-19](#)
- [Moving Files, page 2-19](#)
- [Copying Files, page 2-20](#)
- [Displaying File Contents, page 2-20](#)
- [Saving Command Output to a File, page 2-20](#)
- [Compressing and Uncompressing Files, page 2-21](#)
- [Displaying the Last Line in a File, page 2-21](#)
- [Executing Commands Specified in a Script, page 2-22](#)
- [Setting the Delay Time, page 2-23](#)

## Setting the Current Directory

The **cd** command changes the current directory level to a specified directory level. CLI defaults to the volatile: files system. This command expects a directory name input.



Tip

---

Any file saved in the volatile: file system will be erased when the switch reboots.

---

The syntax for this command is **cd** *directory name*

This example changes the current directory to the mystorage directory that resides in the slot0 directory:

```
switch# cd slot0:mystorage
```

This example changes the current directory to the mystorage directory that resides in the current directory.

```
switch# cd mystorage
```

If the current directory is slot0:mydir, this command changes the current directory to slot0:mydir/mystorage.

## Displaying the Current Directory

The **pwd** command displays the current directory location. This example changes the directory and displays the current directory.

```
switch# cd bootflash:
switch# pwd
bootflash:
```

## Listing the Files in a Directory

The **dir** command displays the contents of the current directory or the specified directory. The syntax for this command is **dir** *directory or file name*

This example shows how to list the files on the default volatile: file system:

```
switch# dir
Usage for volatile: filesystem
          0 bytes total used
          20971520 bytes free
          20971520 bytes available
```

## Creating a New Directory

The **mkdir** command creates a directory at the current directory level or at a specified directory level.

The syntax for this command is **mkdir** *directory name*

This example creates a directory called test in the slot0 directory.

```
switch# mkdir slot0:test
```

This example creates a directory called test at the current directory level.

```
switch# mkdir test
```

If the current directory is slot0:mydir, this command creates a directory called slot0:mydir/test.

## Deleting an Existing Directory

The **rmdir** command deletes an existing directory at the current directory level or at a specified directory level. The directory must be empty to be deleted.

The syntax for this command is **rmdir** *directory name*

This example deletes the directory called test in the slot0 directory.

```
switch# rmdir slot0:test
```

This example deletes the directory called test at the current directory level.

```
switch# rmdir test
```

If the current directory is slot0:mydir, this command deletes the slot0:mydir/test directory.

## Moving Files

The **move** command removes a file from the source directory and places it in the destination directory. If a file with the same name already exists in the destination directory, that file is overwritten by the moved file.

This example moves the file called samplefile from the slot0 directory to the mystorage directory.

```
switch# move slot0:samplefile slot0:mystorage/samplefile
```

This example moves a file from the current directory level.

```
switch# move samplefile mystorage/samplefile
```

If the current directory is slot0:mydir, this command moves slot0:mydir/samplefile to slot0:mydir/mystorage/samplefile.

## Copying Files

The **copy** command copies a file.

This example copies the file called samplefile from the slot0 directory to the mystorage directory.

```
switch# copy slot0:samplefile slot0:mystorage/samplefile
```

This example copies a file from the current directory level.

```
switch# copy samplefile mystorage/samplefile
```

If the current directory is slot0:mydir, this command copies slot0:mydir/samplefile to slot0:mydir/mystorage/samplefile.

You can also use the **copy** command to upload and download files from the slot0: or bootflash: file system to or from a FTP, TFTP, SFTP, or SCP server (see the “Copying Files” section on page 3-27).

## Displaying File Contents

The **show file** command displays the contents of a specified file in the file system.

The syntax for this command is **show file** *file\_name*

This example displays the contents of the test file that resides in the slot0 directory.

```
switch# show file slot0:test
config t
Int fc1/1
no shut
end
show int
```

This example displays the contents of a file residing in the current directory.

```
switch# show file myfile
```

## Saving Command Output to a File

You can force all screen output to go to a file by appending **> filename** to any command. For example, enter **show interface > samplefile** at the EXEC mode switch prompt to save the interface configuration to *samplefile*—a file created at the same directory level. At the EXEC mode switch prompt, issue a **dir** command to view all files in this directory, including the recently saved *samplefile*. See [Chapter 3, “Initial Configuration,”](#) for information on saving and copying configuration files, and [Chapter 5, “Software Images,”](#) for information on saving and copying software images.

**Note**

Redirection is allowed only if the current directory is on the `volatile:` (default) or `slot0:` file systems. Redirection is not allowed if the current directory is on the `bootflash:` file system. The current directory can be viewed using the `pwd` command and changed using the `cd` command.

## Compressing and Uncompressing Files

The `gzip` command compresses (zips) the specified file using LZ77 coding.

This example directs the output of the `show tech-support` command to a file (Samplefile) and then zips the file and displays the difference in the space used up in the `volatile:` directory:

```
switch# show tech-support > Samplefile
Building Configuration ...
switch# dir
 1525859      Jul 04 00:51:03 2003 Samplefile
Usage for volatile://
 1527808 bytes used
 19443712 bytes free
 20971520 bytes total
switch# gzip volatile:Samplefile
switch# dir
 266069      Jul 04 00:51:03 2003 Samplefile.gz
Usage for volatile://
 266240 bytes used
 20705280 bytes free
 20971520 bytes total
```

The `gunzip` command uncompresses (unzips) LZ77 coded files.

This example unzips the file that was compressed in the previous example:

```
switch# gunzip samplefile
/volatile/samplefile.gz: No such file or directory
switch# gunzip Samplefile
switch# dir
 1525859      Jul 04 00:51:03 2003 Samplefile
Usage for volatile://
 1527808 bytes used
 19443712 bytes free
 20971520 bytes total
```

## Displaying the Last Line in a File

The `tail` command displays the last lines (tail end) of a specified file.

The syntax for this command is `tail <file name> [<number of lines>]`

```
switch# tail mylog 10
```

You see the last 10 lines of the `mylog` file.

## Executing Commands Specified in a Script

The **run-script** command executes the commands specified in a file. To use this command, be sure to create the file and specify commands in the required order.



### Note

You cannot create the script files at the switch prompt. You can create the script file on an external machine and copy it to the bootflash: directory. This section assumes that the script file resides in the bootflash: directory.

The syntax for this command is **run-script** *file\_name*

This example displays the CLI commands specified in the testfile that resides in the slot0 directory.

```
switch# show file slot0:testfile
conf t
interface fc 1/1
no shutdown
end
sh interface fc1/1
```

This file output is in response to the **run-script** command executing the contents in the testfile file:

```
switch# run-script slot0:testfile
'conf t'
Enter configuration commands, one per line. End with CNTL/Z.

'interface fc1/1'

'no shutdown'

'end'

'sh interface fc1/1'
fc1/1 is down (Fcot not present)
  Hardware is Fibre Channel
  Port WWN is 20:01:00:05:30:00:48:9e
  Admin port mode is auto, trunk mode is on
  vsan is 1
  Beacon is turned off
  Counter Values (current):
    0 frames input, 0 bytes, 0 discards
    0 runts, 0 jabber, 0 too long, 0 too short
    0 input errors, 0 CRC, 0 invalid transmission words
    0 address id, 0 delimiter
    0 EOF abort, 0 fragmented, 0 unknown class
    0 frames output, 0 bytes, 0 discards
    Received 0 OLS, 0 LRR, 0 NOS, 0 loop inits
    Transmitted 0 OLS, 0 LRR, 0 NOS, 0 loop inits
  Counter Values (5 minute averages):
    0 frames input, 0 bytes, 0 discards
    0 runts, 0 jabber, 0 too long, 0 too short
    0 input errors, 0 CRC, 0 invalid transmission words
    0 address id, 0 delimiter
    0 EOF abort, 0 fragmented, 0 unknown class
    0 frames output, 0 bytes, 0 discards
    Received 0 OLS, 0 LRR, 0 NOS, 0 loop inits
    Transmitted 0 OLS, 0 LRR, 0 NOS, 0 loop inits
```

## Setting the Delay Time

The **sleep** command delays an action by a specified number of seconds.

The syntax for this command is **sleep <seconds>**

```
switch# sleep 30
```

You will see the switch prompt return after 30 seconds.

This command is useful within scripts. For example, if you create a script called test-script:

```
switch# show file slot0:test-script  
discover scsi-target remote  
sleep 10  
show scsi-target disk
```

```
switch# run-script slot0:test-script
```

When you execute the slot0:test-script, the switch software executes the **discover scsi-target remote** command, and then waits for 10 seconds before executing the **show scsi-target disk** command.

## Role-Based CLI

By default, two roles exist in all switches:

- Network operator—Has permission to view the configuration.
- Network administrator—Has permission to execute all commands and to set up to 64 permission levels based on user roles and groups (see [Chapter 14, “Configuring System Security and AAA Services”](#)).

When you execute a command, perform command completion, or obtain context sensitive help, the switch software allows the operation to progress if you have the correct permission as specified in the description of the command.

# Using Valid Formats and Ranges


**Note**

Do not enter ellipsis (...), vertical bar (|), less or great (<>), bracket ([ ]), or braces ( { } ) in command lines. These characters have special meaning in SAN-OS text strings.

Some commands require a MAC address, IP address, or IDs that must be designated in a standard format or given a range. See [Table 2-4](#).

**Table 2-4 Valid Formats and Ranges**

Address	Description	Valid Format Example	Range
MAC address	6 bytes in hexadecimal format separated by colons (not case-sensitive)	00:00:0c:24:d2:Fe	—
IP address	32 bytes, written as 4 octets separated by periods (dotted decimal format) that are made up of a network section, an optional netmask section, and a host section.	126.2.54.1	—
VSAN	Integer that specifies the VSAN.	7	1 to 4093
VLAN	Integer that specifies the VLAN	11	1 to 4093
Port WWN (pWWN)	Eight hexadecimal numbers separated by colons (not case-sensitive).	12:34:56:78:9A:BC:dE:F1	—
Node WWN (nWWN)	Eight hexadecimal numbers separated by colons (not case-sensitive).	12:34:56:78:9A:BC:dE:F1	—
LUN	8 bytes in hexadecimal format separated by colons. A minimum of two hex characters are acceptable. The valid format is hhhh[:hhhh[:hhhh[:hhhh]]]	64 (100d = 64h)	—
FC ID	Six character hexadecimal value prepended by 0x.	0xabc123	—
Domain ID	Integer that specifies the domain.	7	1 to 239
Timers	Integer that specifies timers in milliseconds for latency, FC time out values (TOV).	100	0 to 2147483647
Switching module	Slot in which the applicable switching module resides.	1	1 to 15
Switch priority	Integer specifying switch priority.	5	1 to 254
Channel group	Integer that specifies a PortChannel group addition.	1	1 to 100
Fabric Shortest Path First (FSPF)	Integer that specifies the hold time (in milliseconds) before making FSPF computations.	1000	0 to 65535
Fabric Analyzer	The allowed range for the frame size limit in bytes.	64	64 to 65536
Fabric Analyzer captures	An example of 10 frames, limits the number of frames captured to 10.	10	0 to 2147483647
FCIP profile	Integer that specifies the FCIP profile	101	1 to 255
TCP retransmit time	Integer that specifies the minimum retransmit time for the TCP connection in milliseconds	300	250 to 5000



**Table 2-4 Valid Formats and Ranges (continued)**

Address	Description	Valid Format Example	Range
Keepalive timeout	Integer that specifies the TCP connection's keepalive timeout in seconds.	60	1 to 7200
TCP retransmissions	Integer that specifies the maximum number of TCP transmissions.	6	1 to 8
PMTU	Integer that specifies the path MTU reset time in seconds	90	60 to 3600
TCP buffer size	Integer that specifies the advertised TCP buffer size in KB.	5000	0 to 8192
Traffic burst size	Integer that specifies the maximum burst size in KB.	30	10 to 100
Peer TCP port	Integer that specifies the TCP port number	3000	0 to 65535
Acceptable time difference	Integer that specifies the acceptable time difference in milliseconds for a packet being accepted.	4000	1 to 60,000
iSCSI pWWN allocation	Integer that specifies the number of pWWNs that must be allocated to an iSCSI initiator.	2	1 to 64
CDP refresh and hold time	Integer that specifies the refresh time interval and the hold time in seconds for the CDP protocol.	60	5 to 255

# Managing Licenses

The feature licensing functionality is available in all switches in the Cisco MDS 9000 Family. This functionality allows you to access specified premium features on the switch after you install the appropriate license for that feature.

Licenses will be sold and supported for this release. However, licenses are not being enforced yet, so all features are temporarily available to all users.

This section explains the procedure for installing, clearing, and viewing configured licenses.

## Installing a License

To install a license in any switch in the Cisco MDS 9000 Family, use the **install license** command.

```
switch# install license bootflash:license-file
```

In this example, bootflash: license-file represents the source URL. If a target file name is provided after the source URL, the license file is installed with that name. Otherwise, the filename in the source URL is used. This command also verifies the license file before installing it.

## Clearing Licenses

To clear a specific license in any switch in the Cisco MDS 9000 Family, use the **clear license** command.

```
switch# clear license license-file
```

In this example, license-file represents the name of the license file name that should be removed. Before uninstalling, you need to confirm your intention to delete this file. This confirmation avoids accidental deletion of license files.

To clear all licenses in any switch in the Cisco MDS 9000 Family, use the **clear license all** command.

```
switch# clear license all
```

## Displaying License Information

To display a specific license installed on a switch, use the **show license filename** command (see [Example 2-4](#)).

### Example 2-4 Displays a Specified License

```
switch# show license fcports.lic
fcports.lic:
SERVER this_host ANY
VENDOR cisco
FEATURE fcports cisco 1.000 permanent 30 HOSTID=VDH=4C0AF664 \
SIGN=24B2B68AA676 <----- fcport license
```

To display a list of license files installed on a switch, use the **show license list** command (see [Example 2-5](#)).

**Example 2-5 Displays a List of all Licenses**

```
switch# show license list
fcports.lic
ficon.lic
```

To display all licenses installed on a switch, use the **show license all** command (see [Example 2-6](#)).

**Example 2-6 Displays All Licenses**

```
switch# show license all
fcports.lic:
SERVER this_host ANY
VENDOR cisco
FEATURE fcports cisco 1.000 permanent 30 HOSTID=VDH=4C0AF664 \
SIGN=24B2B68AA676 <-----fcpport license
ficon.lic:
FEATURE ficon cisco 1.000 permanent uncounted HOSTID=VDH=4C0AF664 \
SIGN=CB7872B23700 <-----ficon license
```

To display the host IDs, use the **show license hostid** command. The host ID is required to request node locked license (see [Example 2-7](#)).

**Example 2-7 Displays the Host ID**

```
switch# show license hostid
License hostid:VDH=4C0AF664
```

