Using Cisco IOS Software

This chapter provides helpful tips for understanding and configuring Cisco IOS software using the command-line interface (CLI).

- Getting Help
- Understanding Command Modes
- Using the No and Default Forms of Commands
- Saving Configuration Changes

For an overview of Cisco IOS software configuration, refer to the *Configuration Fundamentals Configuration Guide*.

For information on the conventions used in the Cisco IOS documentation set, refer to the "About this Guide" chapter at the beginning of this book.

Getting Help

Entering a question mark (**?**) at the system prompt displays a list of commands available for each command mode. You can also get a list of any command's associated keywords and arguments with the context-sensitive help feature.

To get help specific to a command mode, a command, a keyword, or an argument, use one of the following commands:

Command	Purpose
help	Obtain a brief description of the help system in any command mode.
*abbreviated-command-entry***?**	Obtain a list of commands that begin with a particular character string. (No space between command and question mark.)
abbreviated-command-entry<**Tab**>	Complete a partial command name.
?	List all commands available for a particular command mode.
command **?**	List a command's associated keywords. (Space between command and question mark.)
command keyword **?**	List a keyword's associated arguments. (Space between the keyword and question mark.)

Finding Command Options

This section provides an example of how to find and display the syntax for a command. The syntax can consist of optional or required keywords. To display keywords for a command, enter a question mark (**?**) at the configuration prompt, or after entering part of a command followed by a space. The Cisco IOS software displays a list of keywords available along with a brief description of the keywords. For example, if you were in global configuration mode, typed the command **arap**, and wanted to see all the keywords for that command, you would type **arap ?**.

The following table shows you how to find the command options for the following two commands:

- **`controller t1 1`**
- **`cas-group 1 timeslots 1-24 type e&m-fgb dtmf`**

Table 1 How to Find Command Options

Command	Comment

`Router>` **`enable`**
`Password: <`*password*`>`
`Router#`
	Enter the **enable** command and password to access privileged EXEC commands.
	You have entered privileged EXEC mode when the prompt changes to `Router#`.

`Router#` **`config terminal`**
`Enter configuration commands, one per line. End with CNTL/Z.`
`Router(config)#`
	Enter global configuration mode.
	You have entered global configuration mode when the prompt changes to `Router(config)#`.

`Router(config)#` **`controller t1 ?`**
`  <0-3>  Controller unit number`
`Router(config)#` **`controller t1 1`**
`Router(config-controller)#`
	Enter controller configuration mode by specifying the T1 controller that you want to configure using the **controller t1** global configuration command.
	Enter a **?** to display what you must enter next on the command line. In this example, you must enter a controller unit number from 0 to 3.
	You have entered controller configuration mode when the prompt changes to `Router(config-controller)#`.

`Router(config-controller)#` **`?`**
`Controller configuration commands:`
`  cablelength  Specify the cable length for a DS1 link`
`  cas-group  Configure the specified timeslots for CAS (Channel Associate Signals)`
`  channel-group  Specify the timeslots to channel-group mapping for an interface`
`  clock  Specify the clock source for a DS1 link`
`  default  Set a command to its defaults`
`  description  Controller specific description`
`  ds0  ds0 commands`
`  exit  Exit from controller configuration mode`
`  fdl  Specify the FDL standard for a DS1 data link`
`  framing  Specify the type of Framing on a DS1 link`
`  help  Description of the interactive help system`
`  linecode  Specify the line encoding method for a DS1 link`
`  loopback  Put the entire T1 line into loopback`
`  no  Negate a command or set its defaults`
`  pri-group  Configure the specified timeslots for PRI`
`  shutdown  Shut down a DS1 link (send Blue Alarm)`
`Router(config-controller)#`
	Enter a **?** to display a list of all the controller configuration commands available for the T1 controller.

Table 1 How to Find Command Options (Continued)

Command	Comment

`Router(config-controller)# cas-group ?`
`  <0-23>  Channel number`
`Router(config-controller)# cas-group`
	Enter the command that you want to configure for the controller. In this example, the **cas-group** command is used.
	Enter a **?** to display what you must enter next on the command line. In this example, you must enter a channel number from 0 to 23.
	Because a <cr> is not displayed, it indicates that you must enter more keywords to complete the command.

`Router(config-controller)# cas-group 1 ?`
`  timeslots  List of timeslots in the cas-group`
`Router(config-controller)# cas-group 1`
	After you enter the channel number, enter a **?** to display what you must enter next on the command line. In this example, you must enter the **timeslots** keyword.
	Because a <cr> is not displayed, it indicates that you must enter more keywords to complete the command.

`Router(config-controller)# cas-group 1 timeslots ?`
`  <1-24>  List of timeslots which comprise the cas-group`
`Router(config-controller)# cas-group 1 timeslots`
	After you enter the **timeslots** keyword, enter a **?** to display what you must enter next on the command line. In this example, you must enter a list of timeslots from 1 to 24.
	You can specify timeslot ranges (for example, 1-24), individual timeslots separated by commas (for example 1, 3, 5), or a combination of the two (for example 1-3, 8, 17-24). The 16th time slot is not specified in the command line, because it is reserved for transmitting the channel signaling.
	Because a <cr> is not displayed, it indicates that you must enter more keywords to complete the command.

`Router(config-controller)# cas-group 1 timeslots 1-24 ?`
`  service  Specify the type of service`
`  type  Specify the type of signaling`
`Router(config-controller)# cas-group 1 timeslots 1-24`
	After you enter the timeslot ranges, enter a **?** to display what you must enter next on the command line. In this example, you must enter the **service** or **type** keyword.
	Because a <cr> is not displayed, it indicates that you must enter more keywords to complete the command.

`Router(config-controller)# cas-group 1 timeslots 1-24 type ?`
`  e&m-fgb  E & M Type II FGB`
`  e&m-fgd  E & M Type IIFGD`
`  e&m-immediate-start  E & M Immediate Start`
`  fxs-ground-start  FXS Ground Start`
`  fxs-loop-start  FXS Loop Start`
`  sas-ground-start  SAS Ground Start`
`  sas-loop-start  SAS Loop Start`
`Router(config-controller)# cas-group 1 timeslots 1-24 type`
	In this example, the **type** keyword is entered. After you enter the **type** keyword, enter a **?** to display what you must enter next on the command line. In this example, you must enter one of the signaling types.
	Because a <cr> is not displayed, it indicates that you must enter more keywords to complete the command.

Table 1 How to Find Command Options (Continued)

Command	Comment

`Router(config-controller)# cas-group 1 timeslots 1-24 type e&m-fgb ?`
`  dtmf  DTMF tone signaling`
`  mf  MF tone signaling`
`  service  Specify the type of service`
`  <cr>`
`Router(config-controller)# cas-group 1 timeslots 1-24 type e&m-fgb`
	In this example, the **e&m-fgb** keyword is entered. After you enter the **e&m-fgb** keyword, enter a **?** to display what you must enter next on the command line. In this example, you can enter the **dtmf**, **mf**, or **service** keyword to indicate the type of channel-associated signaling available for the **e&m-fgb** signaling type.
	
	Because a <cr> is displayed, it indicates that you can enter more keywords or press <cr> to complete the command.

`Router(config-controller)# cas-group 1 timeslots 1-24 type e&m-fgb dtmf ?`
`  dnis  DNIS addr info provisioned`
`  service  Specify the type of service`
`  <cr>`
`Router(config-controller)# cas-group 1 timeslots 1-24 type e&m-fgb dtmf`
	In this example, the **dtmf** keyword is entered. After you enter the **dtmf** keyword, enter a **?** to display what you must enter next on the command line. In this example, you can enter the **dnis** or **service** keyword to indicate the options available for **dtmf** tone signaling.
	
	Because a <cr> is displayed, it indicates that you can enter more keywords or press <cr> to complete the command.

`Router(config-controller)# cas-group 1 timeslots 1-24 type e&m-fgb dtmf` `Router(config-controller)#`	In this example, enter a <cr> to complete the command.

Understanding Command Modes

The Cisco IOS user interface is divided into many different modes. The commands available to you at any given time depend on which mode you are currently in. Entering a question mark (**?**) at the system prompt allows you to obtain a list of commands available for each command mode.

When you start a session on the router, you begin in user mode, often called EXEC mode. Only a limited subset of the commands are available in EXEC mode. In order to have access to all commands, you must enter privileged EXEC mode. Normally, you must enter a password to enter privileged EXEC mode. From privileged mode, you can enter any EXEC command or enter global configuration mode. Most of the EXEC commands are one-time commands, such as **show** commands, which show the current status of something, and **clear** commands, which clear counters or interfaces. The EXEC commands are not saved across reboots of the router.

The configuration modes allow you to make changes to the running configuration. If you later save the configuration, these commands are stored across router reboots. In order to get to the various configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode, subinterface configuration mode, and a variety of protocol-specific modes.

ROM monitor mode is a separate mode used when the router cannot boot properly. If your router or access server does not find a valid system image when it is booting, or if its configuration file is corrupted at startup, the system might enter read-only memory (ROM) monitor mode.

Summary of Command Modes

The following table summarizes some of the main command modes of the Cisco IOS software.

Table 2 Summary of Main Command Modes

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Log in.	`Router>`	Use the **logout** command.
Privileged EXEC	From user EXEC mode, use the **enable** EXEC command.	`Router#`	To exit back to user EXEC mode, use the **disable** command. To enter global configuration mode, use the **configure terminal** privileged EXEC command.
Global configuration	From privileged EXEC mode, use the **configure terminal** privileged EXEC command.	`Router(config)#`	To exit to privileged EXEC mode, use the **exit** or **end** command or press **Ctrl-Z**. To enter interface configuration mode, enter an **interface** configuration command.
Interface configuration	From global configuration mode, enter by specifying an interface with an **interface** command.	`Router(config-if)#`	To exit to global configuration mode, use the **exit** command. To exit to privileged EXEC mode, use the **exit** command or press **Ctrl-Z**. To enter subinterface configuration mode, specify a subinterface with the **interface** command.
Subinterface configuration	From interface configuration mode, specify a subinterface with an **interface** command.	`Router(config-subif)#`	To exit to global configuration mode, use the **exit** command. To enter privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Table 2 Summary of Main Command Modes (Continued)

Command Mode	Access Method	Prompt	Exit Method
ROM monitor	From privileged EXEC mode, use the **reload** EXEC command. Press the Break key during the first 60 seconds while the system is booting.	>	To exit to user EXEC mode, type **continue**.

For more information regarding command modes, refer to the "Using the Command Line Interface" chapter of the *Configuration Fundamentals Configuration Guide*.

Using the No and Default Forms of Commands

Almost every configuration command also has a **no** form. In general, use the **no** form to disable a function. Use the command without the keyword **no** to reenable a disabled function or to enable a function that is disabled by default. For example, IP routing is enabled by default. To disable IP routing, specify the **no ip routing** command and specify **ip routing** to reenable it. The Cisco IOS software command references provide the complete syntax for the configuration commands and describes what the **no** form of a command does.

Configuration commands can also have a **default** form. The **default** form of a command returns the command setting to its default. Most commands are disabled by default, so the **default** form is the same as the **no** form. However, some commands are enabled by default and have variables set to certain default values. In these cases, the **default** command enables the command and sets variables to their default values. The Cisco IOS software command references describe what the **default** form of a command does if the command is not the same as the **no** form.

Saving Configuration Changes

Enter the **copy system:running-config nvram:startup-config** command to save your configuration changes to your startup configuration so that they will not be lost if there is a system reload or power outage. For example:

```
Router# copy system:running-config nvram:startup-config
Building configuration...
```

It might take a minute or two to save the configuration. After the configuration has been saved, the following output appears:

```
[OK]
Router#
```

On most platforms, this step saves the configuration to nonvolatile random-access memory (NVRAM). On the Class A Flash file system platforms, this step saves the configuration to the location specified by the CONFIG_FILE environment variable. The CONFIG_FILE variable defaults to NVRAM.