



Using Cisco IOS Software

This section provides helpful tips for understanding, using, and configuring your routers with the Cisco IOS command-line interface (CLI).

- Getting Help
- Understanding Command Modes
- Finding Command Options
- Using the No and Default Forms of Commands
- Searching and Filtering Output of show and more Commands
- Saving Configuration Changes

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

For information on the conventions used in the Cisco IOS documentation set, refer to the “About This Guide” section 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, enter one of the following commands:

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

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 displays a list of commands available for each command mode.

When starting a session on the router:

- You begin in user mode, often called EXEC mode. Only a limited subset of the commands is available in EXEC mode.
- To access all commands, enter privileged EXEC mode. Normally, you must enter a password to enter privileged EXEC mode. From privileged EXEC 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. EXEC commands are not saved when the router is rebooted.
- To get to the various configuration modes, start at global configuration mode; then, you can enter interface configuration mode, subinterface configuration mode, and a variety of protocol-specific modes. Configuration modes allow you to make changes to the running configuration. Later, if you save the configuration, these commands are stored when the router is rebooted.
- ROM monitor mode is a separate mode that is 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

Table 1 Summary of Main Command Modes of the Cisco IOS Software

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Log in.	Router>	Enter the logout command.
Privileged EXEC	From user EXEC mode, enter the enable EXEC command.	Router#	To return to user EXEC mode, enter the disable command. To access global configuration mode, enter the configure terminal privileged EXEC command.
Global configuration	From privileged EXEC mode, enter the configure terminal privileged EXEC command.	Router(config)#	To return to privileged EXEC mode, enter the exit or end command, or press Ctrl-Z . To access 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 return to global configuration mode, enter the exit command. To return to privileged EXEC mode, enter the exit command, or press Ctrl-Z . To access subinterface configuration mode, specify a subinterface with the interface command.

Table 1 Summary of Main Command Modes of the Cisco IOS Software (continued)

Command Mode	Access Method	Prompt	Exit Method
Subinterface configuration	From interface configuration mode, specify a subinterface with an interface command.	Router(config-subif)#	To return to global configuration mode, enter the exit command. To return to privileged EXEC mode, enter the end command or press Ctrl-Z .
ROM monitor	From privileged EXEC mode, enter the reload EXEC command. Press the “Break” key during the first 60 seconds while the system is booting.	>	To return to user EXEC mode, enter continue .

For more information regarding command modes, refer to “Using the Command-Line Interface” in the *Cisco IOS Configuration Fundamentals Configuration Guide*.

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 and arguments. To see keywords and arguments for a command, enter a question mark (?) at the configuration prompt, or enter a question mark after entering part of a command followed by a space. The Cisco IOS software displays a list of keywords and arguments available along with brief descriptions. For example, if you are in global configuration mode, you can enter the command **arap ?** to see all keywords and arguments for that command.

Table 2 shows examples of how you can use the question mark (?) to assist you in entering commands. It steps you through configuring a serial interface IP address on a Cisco 7206 router running Cisco IOS Release 12.0(3).

Table 2 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# configure 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)#.

Table 2 How to Find Command Options (continued)

Command	Comment
<pre>Router(config)# interface serial ? <0-6> Serial interface number Router(config)# interface serial 4 ? / Router(config)# interface serial 4/ ? <0-3> Serial interface number Router(config)# interface serial 4/0 Router(config-if)#</pre>	<p>Enter interface configuration mode by specifying the serial interface that you want to configure using the interface serial global configuration command.</p> <p>Enter a ? to display what you must enter next on the command line. In this example, you must enter the serial interface slot number and port number, separated by a back slash.</p> <p>You have entered interface configuration mode when the prompt changes to Router(config-if)#.</p>
<pre>Router(config-if)# ? Interface configuration commands: ... ip Interface Internet Protocol config commands keepalive Enable keepalive lan-name LAN Name command llc2 LLC2 Interface Subcommands load-interval Specify interval for load calculation for an interface locaddr-priority Assign a priority group logging Configure logging for interface loopback Configure internal loopback on an interface mac-address Manually set interface MAC address mls mls router sub/interface commands mpoa MPOA interface configuration commands mtu Set the interface Maximum Transmission Unit (MTU) netbios Use a defined NETBIOS access list or enable name-caching no Negate a command or set its defaults nrzi-encoding Enable use of NRZI encoding ntp Configure NTP ... Router(config-if)#</pre>	<p>Enter a ? to display a list of all the interface configuration commands available for the serial interface. This example shows only some of the interface configuration commands that are available.</p>
<pre>Router(config-if)# ip ? Interface IP configuration subcommands: access-group Specify access control for packets accounting Enable IP accounting on this interface address Set the IP address of an interface authentication authentication subcommands bandwidth-percent Set EIGRP bandwidth limit broadcast-address Set the broadcast address of an interface cgmp Enable/disable CGMP directed-broadcast Enable forwarding of directed broadcasts dvmrp DVMRP interface commands hello-interval Configures IP-EIGRP hello interval helper-address Specify a destination address for UDP broadcasts hold-time Configures IP-EIGRP hold time ... Router(config-if)# ip</pre>	<p>Enter the command that you want to configure for the interface. In this example, the ip command is used.</p> <p>Enter a ? to display what you must enter next on the command line. This example shows only some of the interface IP configuration subcommands that are available.</p>

Table 2 How to Find Command Options (continued)

Command	Comment
<pre>Router(config-if)# ip address ? A.B.C.D IP address negotiated IP Address negotiated over PPP Router(config-if)# ip address</pre>	<p>Enter the subcommand that you want to configure for the interface. In this example, the address subcommand is entered.</p> <p>Enter a ? to display what you must enter next on the command line. In this example, you must enter an IP address or the negotiated keyword.</p> <p>Because a carriage return (<cr>) is not displayed, it indicates that you must enter more keywords or arguments to complete the command.</p>
<pre>Router(config-if)# ip address 172.16.0.1 ? A.B.C.D IP subnet mask Router(config-if)# ip address 172.16.0.1</pre>	<p>Enter the keyword or argument you want to use. In this example, the 172.16.0.1 IP address is entered.</p> <p>Enter a ? to display what you must enter next on the command line. In this example, you must enter an IP subnet mask.</p> <p>Because a <cr> is not displayed, it indicates that you must enter more keywords or arguments to complete the command.</p>
<pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 ? secondary Make this IP address a secondary address <cr> Router(config-if)# ip address 172.16.0.1 255.255.255.0</pre>	<p>Enter the IP subnet mask. In this example, the 255.255.255.0 IP subnet mask is entered.</p> <p>Enter a ? to display what you must enter next on the command line. In this example, you can enter the secondary keyword or press Enter.</p> <p>Because a <cr> is displayed, it indicates that you can press Enter to complete the command.</p>
<pre>Router(config-if)# ip address 172.16.0.1 255.255.255.0 Router(config-if)#</pre>	<p>In this example, Enter is pressed to complete the command.</p>

Using the No and Default Forms of Commands

The Cisco IOS software command references provide the complete syntax for the configuration commands and describe each:

- Command
 - Which enables a function that is disabled by default.
 - Which is entered without the keyword **no** to reenables a disabled function.

- Command's **no** form—almost every configuration command has a **no** form:
 - Enter the **no** form to disable a function.
- Command's **default** form—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.

For example, IP routing is enabled by default:

 - To disable IP routing, enter the **no ip routing** command.
 - To reenable IP routing, enter **ip routing**.

Searching and Filtering Output of show and more Commands

In Cisco IOS Release 12.0(1)T or later, you can search and filter the output for **show** and **more** commands. This functionality is useful when you need to sort through large amounts of output, or if you want to exclude output that you do not need to see.

To use this functionality, enter a **show** or **more** command followed by the “pipe” character (`|`), one of the keywords **begin**, **include**, or **exclude**, and an expression that you want to search or filter on:

```
command | {begin | include | exclude} regular-expression
```

The following is an example of the **show interface** command in which you want the output to only include lines where the expression “protocol” appears:

```
Router# show interface | include protocol
FastEthernet0/0 is up, line protocol is up
Serial4/0 is up, line protocol is up
Serial4/1 is up, line protocol is up
Serial4/2 is administratively down, line protocol is down
Serial4/3 is administratively down, line protocol is down
```

For more information on the search and filter functionality, refer to the “Using the Command Line Interface” chapter in the *Cisco IOS Configuration Fundamentals Configuration Guide*.

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, which defaults to NVRAM.

