



## Using Cisco IOS Software

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

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

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, see the “About the Cisco IOS Software Documentation” chapter located at the beginning of this book.

## 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 log in to the Cisco IOS software, you begin in user mode, often called EXEC mode. Only a limited subset of the commands are available in EXEC mode. 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 important status information, and **clear** commands, which clear counters or interfaces. The EXEC commands are not saved when the networking device reboots.

The configuration modes allow you to make changes to the running configuration. If you later save the configuration to the startup configuration, these commands are stored when the networking device reboots. To enter 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 a networking device running Cisco IOS software cannot boot properly. If your networking device does not find a valid system image when it is booting, or if its configuration file is corrupted at startup, the system might enter ROM monitor mode.

## Summary of Main Command Modes

Table 1 summarizes the main command modes of the Cisco IOS software.

**Table 1** Summary of Main Command Modes

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Log in.	Router>	Use the <b>logout</b> command.
Privileged EXEC	From user EXEC mode, use the <b>enable</b> EXEC command.	Router#	To exit back to user EXEC mode, use the <b>disable</b> command. To enter global configuration mode, use the <b>configure terminal</b> privileged EXEC command.
Global configuration	From privileged EXEC mode, use the <b>configure terminal</b> privileged EXEC command.	Router(config)#	To exit to privileged EXEC mode, use the <b>exit</b> or <b>end</b> command or press <b>Ctrl-Z</b> . To enter interface configuration mode, use an <b>interface</b> configuration command.
Interface configuration	From global configuration mode, enter by specifying an interface with an <b>interface</b> command.	Router(config-if)#	To exit to global configuration mode, use the <b>exit</b> command. To exit to privileged EXEC mode, use the <b>exit</b> command or press <b>Ctrl-Z</b> . To enter subinterface configuration mode, specify a subinterface with the <b>interface</b> command.
Subinterface configuration	From interface configuration mode, specify a subinterface with an <b>interface</b> command.	Router(config-subif)#	To exit to global configuration mode, use the <b>exit</b> command. To enter privileged EXEC mode, use the <b>end</b> command or press <b>Ctrl-Z</b> .
ROM monitor	From privileged EXEC mode, use the <b>reload</b> EXEC command. Press the Break key during the first 60 seconds while the system is booting.	>	To exit to user EXEC mode, use the <b>continue</b> command.

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

## 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 keywords and arguments associated with any command by using 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
<b>help</b>	Obtains a brief description of the help system in any command mode.
<i>abbreviated-command-entry?</i>	Obtains a list of commands that begin with a particular character string. (No space between command and question mark.)
<i>abbreviated-command-entry</i> <Tab>	Completes a partial command name.
<b>?</b>	Lists all commands available for a particular command mode.
<i>command ?</i>	Lists the keywords or arguments that you must enter next on the command line. (Space between command and question mark.)

## Example: How to Find Command Options

This section provides an example of how to display syntax for a command. The syntax can consist of optional or required keywords and arguments. To display keywords and arguments 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 and arguments available along with a brief description of them. For example, if you were in global configuration mode, typed the command **arap**, and wanted to see all the keywords or arguments that may be entered next on the command line, you would type **arap ?**.

Table 2 shows examples of how you can use the question mark (?) to assist you in entering commands. The table 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> <b>enable</b> Password: <password> Router#	Enter the <b>enable</b> command and password to access privileged EXEC commands.  You are in privileged EXEC mode when the prompt changes to Router#.
Router# <b>configure terminal</b> Enter configuration commands, one per line. End with CNTL/Z. Router(config)#	Enter the <b>configure terminal</b> privileged EXEC command to enter global configuration mode.  You are in global configuration mode when the prompt changes to Router (config) #.

**Table 2** How to Find Command Options (continued)

Command	Comment
<pre>Router(config)# <b>interface serial</b> ? &lt;0-6&gt;      Serial interface number Router(config)# <b>interface serial 4</b> ? / Router(config)# <b>interface serial 4/</b> ? &lt;0-3&gt;      Serial interface number Router(config)# <b>interface serial 4/0</b> Router(config-if)#</pre>	<p>Enter interface configuration mode by specifying the serial interface that you want to configure using the <b>interface serial</b> global configuration command.</p> <p>Enter a <b>?</b> 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 are in interface configuration mode when the prompt changes to Router(config-if)#.</p>
<pre>Router(config-if)# <b>?</b> 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 <b>?</b> 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)# <b>ip</b> ? 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)# <b>ip</b></pre>	<p>Enter the command that you want to configure for the interface. In this example, the <b>ip</b> command is used.</p> <p>Enter a <b>?</b> 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 <b>address</b> subcommand is entered.</p> <p>Enter a <b>?</b> to display what you must enter next on the command line. In this example, you must enter an IP address or the <b>negotiated</b> keyword.</p> <p>Because a carriage return (&lt;cr&gt;) 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 <b>?</b> 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 &lt;cr&gt; 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 &lt;cr&gt; 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 <b>?</b> to display what you must enter next on the command line. In this example, you can enter the <b>secondary</b> keyword or press <b>Enter</b>.</p> <p>Because a &lt;cr&gt; is displayed, it indicates that you can press <b>Enter</b> 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, <b>Enter</b> is pressed to complete the command.</p>

## 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 re-enable 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, use the **no ip routing** command and specify **ip routing** to re-enable it. The Cisco IOS software command reference publications provide the complete syntax for the configuration commands and describe 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 reference publications 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 task saves the configuration to NVRAM. On the Class A Flash file system platforms, this task saves the configuration to the location specified by the CONFIG\_FILE environment variable. The CONFIG\_FILE variable defaults to NVRAM.

## 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
Fast Ethernet0/0 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*.