

Using Cisco IOS XE Software

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Command modes

The command modes available in Cisco IOS XE are the same as those available in traditional Cisco IOS. Use the CLI to access Cisco IOS XE software. Because the CLI is divided into many different modes, the commands available to you at any given time depend on the mode that you are currently in. Entering a question mark (**?**) at the CLI prompt allows you to obtain a list of commands available for each command mode.

When you log in to the CLI, you are in user EXEC mode. User EXEC mode contains only a limited subset of commands. To have access to all commands, you must enter privileged EXEC mode, normally by using a password. From privileged EXEC mode, you can issue any EXEC command—user or privileged mode—or you can enter global configuration mode. Most EXEC commands are one-time commands. For example, **show** commands show important status information, and **clear** commands clear counters or interfaces. The EXEC commands are not saved when the software reboots.

Configuration modes allow you to make changes to the running configuration. If you later save the running configuration to the startup configuration, these changed commands are stored when the software is rebooted. To enter specific configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode and a variety of other modes, such as protocol-specific modes.

ROM monitor mode is a separate mode used when the Cisco IOS XE software cannot load properly. If a valid software image is not found when the software boots or if the configuration file is corrupted at startup, the software might enter ROM monitor mode.

Table 1: Accessing and exiting 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** command.	`Router#`	To return to user EXEC mode, use the **disable** command.
Global configuration	From privileged EXEC mode, use the **configure termina**l command.	`Router(config)#`	To return to privileged EXEC mode from global configuration mode, use the **exit** or **end** command.
Interface configuration	From global configuration mode, specify an interface using an **interface** command.	`Router(config-if)#`	To return to global configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.
Diagnostic	The router boots up or accesses diagnostic mode in these scenarios: • In some cases, diagnostic mode will be reached when the Cisco IOS process or processes fail. In most scenarios, however, the router will reload. • A user-configured access policy is configured using the **transport-map** command that directs a user into diagnostic mode. • A break signal (**Ctrl-C**, **Ctrl-Shift-6**, or the **send break** command) is entered and the router is configured to go to diagnostic mode when the break signal is received.	`Router(diag)#`	If failure of the Cisco IOS process is the reason for entering diagnostic mode, the Cisco IOS problem must be resolved and the router rebooted to get out of diagnostic mode. If the router is in diagnostic mode because of a transport-map configuration, access the router through another port or by using a method that is configured to connect to the Cisco IOS CLI.
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.	`rommon#>`	To exit ROM monitor mode, manually boot a valid image or perform a reset with autoboot set so that a valid image is loaded.

Use keyboard shortcuts

Commands are not case sensitive. You can abbreviate commands and parameters if the abbreviations contain enough letters to be different from any other currently available commands or parameters.

Table 2: Keyboard shortcuts

Key Name	Purpose
Ctrl-B or the **Left Arrow** key	Move the cursor back one character.
Ctrl-F or the **Right Arrow** key	Move the cursor forward one character.
Ctrl-A	Move the cursor to the beginning of the command line.
Ctrl-E	Move the cursor to the end of the command line.
Esc B	Move the cursor back one word.
Esc F	Move the cursor forward one word.

No and default command forms

No and default command forms are CLI command variations that

- provide options to disable, enable, or reset configuration functions
- apply to almost every configuration command in Cisco IOS software, and
- allow administrators to modify command behavior without entering complete command syntax.

Command form functions

The **no** form is used to disable a function. Use the command without the **no** keyword 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; to re-enable IP routing, use the **IP routing** command. 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.

By issuing the **<command> default** command-name, you can configure the command to its default setting. The Cisco IOS software command reference publications describe the function from a **default** form of the command when the **default** form performs a different function than the plain and **no** forms of the command. To see what default commands are available on your system, enter **default ?** in the appropriate command mode.

Use the history buffer to recall commands

The history buffer stores the last 20 commands you entered. History substitution allows you to access these commands without retyping them, by using special abbreviated commands.

Table 3: History substitution commands

Command	Purpose
Ctrl-P or the **Up Arrow** key	Recalls commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
Ctrl-N or the **Down Arrow** key[1]	Returns to more recent commands in the history buffer after recalling commands with **Ctrl-P** or the **Up Arrow** key.
Router# show history	While in EXEC mode, lists the last few commands you entered.

Configuration files management

Managing configuration files is a router maintenance process that:

- stores startup configuration files in the nvram: file system and running configuration files in the system: file system
- provides encryption of configuration files through IOS XE features, and
- enables backup of configuration files to prevent data loss.

Configuration file storage and management

This configuration file storage setup is also used on several other Cisco router platforms.

IOS XE provides encryption of the configuration file. Encryption is discussed in length in the IOS XE hardening device guide which can be found here:https://www.cisco.com/c/en/us/support/docs/ip/access-lists/13608-21.html

As a matter of routine maintenance on any Cisco router, users should back up the startup configuration file by copying the startup configuration file from NVRAM to one of the router's other file systems and, additionally, to a network server. Backing up the startup configuration file provides an easy method of recovering the startup configuration file if the startup configuration file in NVRAM becomes unusable for any reason.

The **copy** command can be used to back up startup configuration files.

For more detailed information on managing configuration files, see the "Managing Configuration Files" section in the Cisco IOS XE Configuration Fundamentals Configuration Guide.

Save configuration changes

Save configuration changes to the startup configuration so that the changes will not be lost if the software reloads or a power outage occurs.

This task saves the configuration to the NVRAM.

Procedure

Use the **copy running-config startup-config** command to save your configuration changes to the startup configuration.

Example:

```
Router# copy running-config startup-config
Destination filename [startup-config]? enter
Building configuration...
[OK]
Router#
*Sep 24 08:50:26.666: %SYS-6-PRIVCFG_ENCRYPT_SUCCESS: Successfully encrypted private config file
```

Note
It may take a few minutes to save the configuration.

The configuration is saved to the NVRAM and changes persist through software reloads and power outages.

Filtering output from show and more commands

Filtering output from show and more commands is a functionality that

- searches and filters the output of **show** and **more** commands
- helps you sort through large amounts of output, and
- excludes output that you need not see.

Command syntax

To use this functionality, enter a **show** or **more** command followed by the "pipe" character (|); one of the keywords **begin**, **include**, or **exclude**; and a regular expression on which you want to search or filter (the expression is case sensitive):

show *command* | **{append | begin | exclude | include | redirect | section | tee}** *regular-expression*

The output matches certain lines of information in the configuration file.

The example for show interface command with include protocol modifier is as given.

In this example, a modifier of the **show interface** command (**include protocol**) is used to provide only the output lines in which the expression **protocol** is displayed:

```
Router# show interface | include protocol
GigabitEthernet0/0/0 is administratively down, line protocol is down (disabled)
```

```
0 unknown protocol drops
GigabitEthernet0/1/0 is down, line protocol is down (notconnect)
0 unknown protocol drops
GigabitEthernet0/1/1 is down, line protocol is down (notconnect)
0 unknown protocol drops
GigabitEthernet0/1/2 is down, line protocol is down (notconnect)
0 unknown protocol drops
GigabitEthernet0/1/3 is down, line protocol is down (notconnect)
0 unknown protocol drops
GigabitEthernet0/0/5 is up, line protocol is up (connected)
0 unknown protocol drops
Cellular0/4/0 is up, line protocol is up
0 unknown protocol drops
Cellular0/4/1 is administratively down, line protocol is down
0 unknown protocol drops
Cellular0/5/0 is up, line protocol is up
0 unknown protocol drops
Cellular0/5/1 is administratively down, line protocol is down
0 unknown protocol drops
Async0/2/0 is up, line protocol is down
0 unknown protocol drops
Vlan1 is up, line protocol is up , Autostate Enabled
0 unknown protocol drops
Vlan172 is up, line protocol is down , Autostate Enabled
0 unknown protocol drops
Vlan175 is down, line protocol is down , Autostate Enabled
0 unknown protocol drops
IR1800#
```

Cisco feature navigator

Cisco Feature Navigator is a tool that:

- enables you to determine which Cisco IOS XE software images support a specific software release, feature set, or platform
- provides information about platform support and software image support, and
- does not require an account on Cisco.com to use.

Find support information for platforms and Cisco software images

The Cisco IOS XE software is packaged in feature sets consisting of software images that support specific platforms. The group of feature sets that are available for a specific platform depends on which Cisco software images are included in a release.

All of the Cisco IOS-XE configuration guides can be found here: https://www.cisco.com/c/en/us/support/ios-nx-os-software/ios-xe-17/series.html.

To identify the set of software images available in a specific release or to find out if a feature is available in a given Cisco IOS XE software image, you can use Cisco Feature Navigator or see the https://www.cisco.com/c/en/us/support/ios-nx-os-software/ios-xe-17/series.html.

Get help

Entering a question mark (**?**) at the CLI 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 that is specific to a command mode, a command, a keyword, or an argument, use one of these commands.

Command	Purpose
help	Provides a brief description of the help system in any command mode.
abbreviated-command-entry ?	Provides a list of commands that begin with a particular character string. **Note** There is no space between the command and the question mark.
abbreviated-command-entry <Tab>	Completes a partial command name.
?	Lists all the commands that are available for a particular command mode.
command ?	Lists the keywords or arguments that you must enter next on the command line. **Note** There is a space between the command and the question mark.

Find command options

This section provides information about how to display the 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 a part of a command followed by a space. The Cisco IOS XE software displays a list and brief descriptions of the available keywords and arguments. For example, if you are in global configuration mode and want to see all the keywords and arguments for the **arap** command, you should type **arap ?**.

The <**cr**> symbol in command help output stands for carriage return. On older keyboards, the carriage return key is the **Return** key. On most modern keyboards, the carriage return key is the **Enter** key. The <**cr**> symbol at the end of command help output indicates that you have the option to press **Enter** to complete the command and that the arguments and keywords in the list preceding the <**cr**> symbol are optional. The <**cr**> symbol by itself indicates that no more arguments or keywords are available, and that you must press **Enter** to complete the command.

Table 4: Finding command options

Command	Comment

`Router> enable`
`Password: <password>`
`Router#`
	Enter the **enable** command and password to access privileged EXEC commands. You are in privileged EXEC mode when the prompt changes to a " # " from the " > ", for example, **Router>** to **Router#**

`Router# configure terminal`
`Enter configuration commands, one per line. End with CNTL/Z.`
`Router(config)#`
	Enter the **configure terminal** privileged EXEC command to enter global configuration mode. You are in global configuration mode when the prompt changes to **Router (config)#**

`Router(config)# interface GigabitEthernet ?`
`<0-0> GigabitEthernet interface number`
 	
`Router(config)# interface GigabitEthernet 0/?`
`<0-5> Port Adapter number`
 	
`Router (config)# interface GigabitEthernet 0/0/?`
`<0-63> GigabitEthernet interface number`
 	
`Router (config)# interface GigabitEthernet 0/0/0?`
`.  <0-71>`
 	
`Router(config-if)#`
	Enter interface configuration mode by specifying the interface that you want to configure, using the **interface GigabitEthernet** global configuration command.
	
	Enter **?** to display what you must enter next on the command line.
	
	When the <cr> symbol is displayed, you can press **Enter** to complete the command.
	
	You are in interface configuration mode when the prompt changes to **Router(config-if)#**

Command	Comment

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)#
	Enter **?** to display a list of all the interface configuration commands available for the interface. This example shows only some of the available interface configuration commands.

Command	Comment

`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`
	Enter the command that you want to configure for the interface. This example uses the **IP** command.
	Enter **?** to display what you must enter next on the command line. This example shows only some of the available interface IP configuration commands.

`Router(config-if)# ip address ?`
`  A.B.C.D  IP address`
`  negotiated  IP Address negotiated over PPP`
`Router(config-if)# ip address`
	Enter the command that you want to configure for the interface. This example uses the **IP address** command.
	Enter **?** to display what you must enter next on the command line. In this example, you must enter an IP address or the **negotiated** keyword.
	A carriage return (<cr>) is not displayed. Therefore, you must enter additional keywords or arguments to complete the command.

`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`
	Enter the keyword or argument that you want to use. This example uses the 172.16.0.1 IP address.
	Enter **?** to display what you must enter next on the command line. In this example, you must enter an IP subnet mask.
	<cr> is not displayed. Therefore, you must enter additional keywords or arguments to complete the command.

Command	Comment
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	Enter the IP subnet mask. This example uses the 255.255.255.0 IP subnet mask. Enter **?** to display what you must enter next on the command line. In this example, you can enter the **secondary** keyword, or you can press **Enter**. <cr> is displayed. Press **Enter** to complete the command, or enter another keyword.
Router(config-if)# ip address 172.16.0.1 255.255.255.0 Router(config-if)#	Press **Enter** to complete the command.

Software advisor

Software Advisor is a Cisco tool that:

- checks if a feature is supported in a Cisco IOS XE release
- locates the software document for that feature, and
- verifies the minimum software requirements of Cisco IOS XE software with the hardware installed on your router.

Software advisor access requirements

You must be a registered user on Cisco.com to access this tool. Cisco maintains the Software Advisor tool. See Tools and Resources.

Use software release notes

Software release notes provide essential information about the current release. This reference lists the types of information available in release notes and explains how to access cumulative feature information from previous releases.

Release notes contain information about these topics:

- Product overview
- Open and resolved severity 1 and 2 caveats
- Software image names
- New features
- Known limitations

Release notes are intended to be release-specific for the most current release, and the information provided in these documents may not be cumulative in providing information about features that first appeared in

previous releases. For cumulative feature information, refer to the Cisco Feature Navigator at: http://www.cisco.com/go/cfn/.