

Understanding the User Interface

The Cisco Internetwork Operating System (Cisco IOS) user interface provides access to several different command modes. Each command mode provides a group of related commands. This chapter describes how to access and list the commands available in each command mode, and explains the primary uses for each command mode.

For security purposes, the Cisco IOS provides two levels of access to commands: *user* and *privileged*. The unprivileged, user mode is called user EXEC mode. The privileged mode is called privileged EXEC mode, and requires a password. The commands available in user EXEC mode are a subset of the commands available in privileged EXEC mode.

From the privileged level, you can access global configuration mode and ten specific configuration modes: interface, subinterface, controller, hub, map-list, map-class, line, router, IPX-router, and route-map configuration. In addition, if your router does not find a valid system image, or if its configuration file is corrupted at startup, the system might enter read-only memory (ROM) monitor mode. Entering a question mark (?) at the system prompt allows you to obtain a list of commands available for each command mode.

Almost every router configuration command also has a **no** form. In general, use the **no** form to disable a feature or function. Use the command without the keyword **no** to reenable a disabled feature or to enable a feature that is disabled by default. For example, IP routing is enabled by default. Specify the command **no ip routing** to disable IP routing and specify **ip routing** to reenable it. The *Router Products Command Reference* publication provides the complete syntax for every router configuration command and describes what the **no** form of a command does.

The user interface also provides context-sensitive help on command syntax. This chapter describes how to use the help system. It also describes the command editing and command history features that enable you to recall previous command entries and easily edit command entries.

For a complete description of the commands mentioned in this chapter, refer to the “User Interface Commands” chapter in the *Router Products Command Reference* publication.

User Interface Task List

You can perform the tasks in the following sections to become familiar with the Cisco IOS user interface:

- Access Each Command Mode
- Get Context-Sensitive Help
- Check Command Syntax
- Use the Command History Features

- Use the Editing Features
- End a Session
- Use the Cisco Web Browser Interface to Issue Commands

Access Each Command Mode

This section describes how to access each of the Cisco IOS command modes:

- User EXEC Mode
- Privileged EXEC Mode
- Global Configuration Mode
- Interface Configuration Mode
- Subinterface Configuration Mode
- Controller Configuration Mode
- Hub Configuration Mode
- Map-List Configuration Mode
- Map-Class Configuration Mode
- Line Configuration Mode
- Router Configuration Mode
- IPX-Router Configuration Mode
- Route-Map Configuration Mode
- ROM Monitor Mode
- LANE Database Configuration Mode
- APPN Command Modess
- Interface Channel Configuration Mode
- Internal LAN Configuration Mode
- Internal Adapter Configuration Mode

Table 2-1 lists the command modes, how to access each mode, the prompt you will see while you are in that mode, the main uses for each configuration mode, and the method to exit that mode. The prompts listed assume the default router name “Router.” Table 2-1 might not include all of the possible ways to access or exit each command mode.

Table 2-1 Summary of Command Modes

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Log in to the router.	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 privileged EXEC command.

Command Mode	Access Method	Prompt	Exit Method
Global configuration	From privileged EXEC mode, use the configure 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 .
Controller configuration	From global configuration mode, use the controller command to configure a channelized T1 interface.	Router (config-controller) #	To exit to global configuration mode, use the exit command. To enter privileged EXEC mode, use the end command or press Ctrl-Z .
Hub configuration	From global configuration mode, enter by specifying a hub with the hub command.	Router (config-hub) #	To exit to global configuration mode, use the exit command. To enter privileged EXEC mode, use the end command or press Ctrl-Z .
Map-list configuration	From global configuration mode, define a map list with the map-list command.	Router (config-map-list) #	To exit to map-class configuration mode, use the map-class command. To enter privileged EXEC mode, use the end command or press Ctrl-Z .
Map-class configuration	From global configuration mode, configure a map class with the map-class command.	Router (config-map-class) #	To exit to global configuration mode, use the exit command. To enter privileged EXEC mode, press Ctrl-Z .
Line configuration	From global configuration mode, enter by specifying a line with a line command.	Router (config-line) #	To exit to global configuration mode, use the exit command. To enter privileged EXEC mode use the end command or press Ctrl-Z .
Router configuration	From global configuration mode, enter by issuing a command that begins with router (such as router igrp).	Router (config-router) #	To exit to global configuration mode, use the exit command. To enter privileged EXEC mode, use the end command or press Ctrl-Z .
IPX-router configuration	From global configuration mode, enter by issuing the ipx routing command, then a command that begins with ipx router (such as ipx router eigrp).	Router (config-ipx-router) #	To exit to global configuration mode, use the exit command.
Route-map configuration	From global configuration mode, enter by specifying the route-map command.	Router (config-route-map) #	To exit to global configuration mode, use the exit command. To enter privileged EXEC mode, press Ctrl-Z .

Access Each Command Mode

Command Mode	Access Method	Prompt	Exit Method
ROM monitor	From privileged EXEC mode, use the reload EXEC command. Press Break during the first 60 seconds while the system is booting.	>	To exit to user EXEC mode, type continue .
LANE database configuration	From global EXEC mode, use the lane database database name command.	Router (config)	To exit to global configuration mode, use the exit command. To exit to privileged EXEC mode, use the end command or press Ctrl-Z .
APPN configuration	From global EXEC mode, use the appn mode modename command.	Router (appn) #	To exit to global configuration mode, use the exit command. To exit to privileged EXEC mode, use the end command or press Ctrl-Z .
Interface channel configuration	From global EXEC mode, use the interface channel I/2 command.	Router (config)	To exit to interface configuration mode, use the exit command.
Internal LAN configuration	From global EXEC mode, use the lan command.	Router (config-if)	To exit to interface configuration mode, use the exit command.
Internal adapter configuration	From internal LAN configuration mode, enter the adapter command.	Router (config-lan)	To exit to interface configuration mode, use the exit command.

User EXEC Mode

After you log in to the router, you are automatically in user EXEC command mode. The EXEC commands available at the user level are a subset of those available at the privileged level. In general, the user EXEC commands allow you to connect to remote routers, change terminal settings on a temporary basis, perform basic tests, and list system information.

To list the user EXEC commands, complete the following task:

Task	Command
List the user EXEC commands.	?

The user-level prompt consists of the router's host name followed by the angle bracket (>):

```
Router>
```

The default host name is `Router` unless it has been changed during initial configuration using the **setup** command. (Refer to the *Router Products Getting Started Guide* for information on the **setup** facility.) You can also change the router name using the **hostname** global configuration command described in the "System Management Commands" chapter in the *Router Products Command Reference* publication.

To list the commands available in user EXEC mode, enter a question mark (?) as shown in the following example:

```
Router> ?
Exec commands:
  connect      Open a terminal connection
  disconnect   Disconnect an existing telnet session
```

```

enable          Turn on privileged commands
exit            Exit from the EXEC
help            Description of the interactive help system
lock            Lock the terminal
login           Log in as a particular user
logout          Exit from the EXEC
name-connection Name an existing telnet connection
ping            Send echo messages
resume          Resume an active telnet connection
show            Show running system information
systat          Display information about terminal lines
telnet          Open a telnet connection
terminal        Set terminal line parameters
where           List active telnet connections
Router>

```

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

Privileged EXEC Mode

Because many of the privileged commands set operating parameters, privileged access should be password-protected to prevent unauthorized use. The privileged command set includes those commands contained in user EXEC mode, as well as the **configure** command through which you can access the remaining command modes. Privileged EXEC mode also includes high-level testing commands, such as **debug**. For details on the **debug** commands, see the *Debug Command Reference* publication.

To access and list the privileged EXEC commands, complete the following tasks:

Task	Command
Step 1 Enter the privileged EXEC mode.	enable [password]
Step 2 List privileged EXEC commands.	?

If the system administrator has set a password, you are prompted to enter it before being allowed access to privileged EXEC mode. The password is not displayed on the screen and is case sensitive. If an enable password has not been set, enabled mode can only be accessed from the console. The system administrator uses the **enable password global configuration** command to set the password that restricts access to privileged mode. This command is described in the “System Management Commands” chapter in the *Router Products Command Reference* publication.

The privileged EXEC mode prompt consists of the router’s host name followed by the pound sign (#). (If the router was named with the **hostname** command, that name would appear as the prompt instead of “Router.”)

```
Router#
```

The following example shows how to access privileged EXEC mode and list privileged EXEC commands:

```

Router> enable
Password:
Router# ?
Exec commands:
 bfe          For manual emergency modes setting
 clear        Reset functions
 clock        Manage the system clock
 configure    Enter configuration mode

```

Access Each Command Mode

connect	Open a terminal connection
copy	Copy a config file to or from a tftp server
debug	Debugging functions
disable	Turn off privileged commands
disconnect	Disconnect an existing telnet session
enable	Turn on privileged commands
exit	Exit from the EXEC
help	Description of the interactive help system
llc2	Execute llc2 tests
lock	Lock the terminal
login	Log in as a particular user
logout	Exit from the EXEC
name-connection	Name an existing telnet connection
ping	Send echo messages
reload	Halt and perform a cold restart
resume	Resume an active telnet connection
send	Send a message to other tty lines
setup	Run the SETUP command facility
show	Show running system information
systat	Display information about terminal lines
telnet	Open a telnet connection
terminal	Set terminal line parameters
test	Test subsystems, memory, and interfaces
trace	Trace route to destination
where	List active telnet connections
which-route	Do route table lookup and display results
write	Write running configuration to memory, network, or terminal

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

From the privileged level, you can access global configuration mode. For instructions, see the “Global Configuration Mode” section, which follows this section.

To return from privileged EXEC mode to user EXEC mode, perform the following task:

Task	Command
Move from privileged EXEC mode to user EXEC mode.	disable

Global Configuration Mode

Global configuration commands apply to features that affect the system as a whole. Use the **configure** privileged EXEC command to enter global configuration mode. When you enter this command, the EXEC prompts you for the source of the configuration commands:

```
Configuring from terminal, memory, or network [terminal]?
```

You can then specify either the terminal, nonvolatile memory (NVRAM), or a file stored on a network server as the source of configuration commands (see the “System Image, Microcode Image, and Configuration File Load Commands” chapter in the *Router Products Command Reference* publication). The default is to enter commands from the terminal console. Pressing the Return key begins this configuration method.

Commands to enable a particular routing or bridging function are also global configuration commands. For information on protocol-specific global configuration commands, see the appropriate chapter in this guide.

To access and list the global configuration commands, complete the following tasks:

Task	Command
Step 1 At the terminal, from the privileged EXEC mode, enter global configuration mode.	configure ¹ <CR>
Step 2 List the global configuration commands.	?

1. This command is documented in the “System Image, Microcode Image, and Configuration File Load Commands” chapter in the *Router Products Command Reference* publication.

The following example shows how to access global configuration mode and list global configuration commands:

```
Router# configure
Configuring from terminal, memory, or network [terminal]? <CR>
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# ?
Configure commands:
access-list          Add an access list entry
apollo              Apollo global configuration commands
appletalk           Appletalk global configuration commands
arp                 Set a static ARP entry
async-bootp        Modify system bootp parameters
autonomous-system   Specify local AS number to which we belong
banner              Define a login banner
boot                Modify system boot parameters
bridge              Transparent bridging
buffers             Adjust system buffer pool parameters
busy-message        Display message when connection to host fails
chat-script         Define a modem chat script
clns                 Global CLNS configuration subcommands
clock               Configure time-of-day clock
decnet              Global DECnet configuration subcommands
default-value       Default character-bits values
dialer-list         Create a dialer list entry
enable              Modify enable password parameters
end                 Exit from configure mode
exit                Exit from configure mode
frame-relay         Global frame relay configuration commands
help                Description of the interactive help system
hostname            Set system's network name
interface           Select an interface to configure
ip                  Global IP configuration subcommands
ipx                 Novell/IPX global configuration commands
line                Configure a terminal line
lnm                 IBM Lan Manager
locaddr-priority-list Establish queueing priorities based on LU address
logging             Modify message logging facilities
login-string        Define a host-specific login string
mop                 The DEC MOP Server
netbios            NETBIOS access control filtering
no                  Negate a command or set its defaults
ntp                 Configure NTP
priority-list       Build a priority list
queue-list          Build a custom queue list
rif                 Source-route RIF cache
route-map           Create route-map or enter route-map command mode
router              Enable a routing process
scheduler-interval Maximum interval before running lowest priority process
service             Modify use of network based services
smt-queue-threshold Set the max number of unprocessed SMT frames
snmp-server         Modify SNMP parameters
```

Access Each Command Mode

source-bridge	Source-route bridging ring groups
stun	STUN global configuration commands
tacacs-server	Modify TACACS query parameters
tftp-server	Provide TFTP service for netload requests
tn3270	tn3270 configuration command
username	Establish User Name Authentication
vines	Vines global configuration commands
x25	X.25 Level 3
xns	XNS global configuration commands

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

To exit global configuration command mode and return to privileged EXEC mode, use one of the following commands:

Task	Command
Exit global configuration mode.	exit end Ctrl-Z

From global configuration mode, you can access sixteen configuration modes: interface, subinterface, hub, controller, map-list, map-class, line, router, ipx-router, route-map, APPN modes, interface channel, internal LAN, and internal adapter configuration commands. These command modes are described in the following sections.

Interface Configuration Mode

Many features are enabled on a per-interface basis. Interface configuration commands modify the operation of an interface such as an Ethernet, FDDI, or serial port. Interface configuration commands always follow an **interface** global configuration command, which defines the interface type.

For details on interface configuration commands that affect general interface parameters, such as bandwidth, clock rate, and so on, see the “Configuring Interfaces” chapter. For protocol-specific commands, see the appropriate chapter in this guide.

To access and list the interface configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, enter interface configuration mode.	interface <i>type-number</i> ¹
Step 2 List the interface configuration commands.	?

1. This command is documented in the “Interface Commands” chapter in the *Router Products Command Reference* publication.

In the following example, serial interface 0 is about to be configured. The new prompt Router(config-if)# indicates interface configuration mode. In this example, the user asks for help by requesting a list of commands.

```
Router(config)# interface serial 0 <CR>
Router(config-if)# ?
Interface configuration commands:
  access-expression    Build a bridge boolean access expression
  apollo               Apollo interface subcommands
  appletalk            Appletalk interface subcommands
  arp                 Set arp type (arpa, probe, snap) or timeout
```

backup	Modify dial-backup parameters
bandwidth	Set bandwidth informational parameter
bridge-group	Transparent bridging interface parameters
clns	CLNS interface subcommands
clockrate	Configure serial interface clock speed
custom-queue-list	Assign a custom queue list to an interface
decnet	Interface DECnet config commands
delay	Specify interface throughput delay
description	Interface specific description
dialer	Dial-on-demand routing (DDR) commands
dialer-group	Assign interface to dialer-list
down-when-looped	Force looped serial interface down
encapsulation	Set encapsulation type for an interface
ethernet-transit-oui	Token-ring to Ethernet OUI handling
exit	Exit from interface configuration mode
frame-relay	Set frame relay parameters
hdh	Set HDH mode
help	Description of the interactive help system
hold-queue	Set hold queue depth
ip	Interface Internet Protocol config commands
ipx	Novell interface subcommands
isis	IS-IS commands
iso-igrp	ISO-IGRP interface subcommands
keepalive	Enable keepalive
lapb	X.25 Level 2 parameters (Link Access Procedure, Balanced)
llc2	LLC2 Interface Subcommands
lnm	IBM Lan Manager
locaddr-priority	Assign a priority group
loopback	Configure internal loopback on an interface
mac-address	Manually set interface MAC address
mop	DEC MOP server 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
ntp	Configure NTP
ppp	Point-to-point protocol
priority-group	Assign a priority group to an interface
pulse-time	Enables pulsing of DTR during resets
pup	PUP interface subcommands
sdhc	SDLC commands
sdllc	Configure SDLC to LLC2 translation
shutdown	Shutdown the selected interface
smns	Modify SMNS parameters
source-bridge	Configure interface for source-route bridging
stun	STUN interface subcommands
transmit-interface	Assign a transmit interface to a receive-only interface
transmitter-delay	Set dead-time after transmitting a datagram
tunnel	protocol-over-protocol tunneling
tx-queue-limit	Configure card level transmit queue limit
vines	Vines interface subcommands
xns	XNS interface subcommands

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

To exit interface configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Subinterface Configuration Mode

You can configure multiple virtual interfaces (called subinterfaces) on a single physical interface. This feature is supported on serial interfaces with Frame Relay encapsulation.

Subinterfaces appear to be distinct physical interfaces to the various protocols. For example, Frame Relay networks provide multiple point-to-point links called permanent virtual circuits (PVCs). PVCs can be grouped under separate subinterfaces that in turn are configured on a single physical interface. From a bridging spanning-tree viewpoint, each subinterface is a separate bridge port, and a frame arriving on one subinterface can be sent out on a another subinterface.

Subinterfaces also allow multiple encapsulations for a protocol on a single interface. For example, a router can receive an ARPA-framed IPX packet and forward the packet back out the same physical interface as a SNAP-framed IPX packet.

For detailed information on how to configure subinterfaces, see the appropriate chapter for a specific protocol, later in this publication.

To access and list the subinterface configuration commands, complete the following tasks:

Task	Command
Step 1 From interface configuration mode, configure a virtual interface.	See the example that follows. For information on interface commands that allow subinterface implementation, see the protocol specific chapter later in this publication.
Step 2 List the subinterface configuration commands.	?

In the following example, a subinterface is configured for serial line 2, which is configured for Frame Relay encapsulation. The subinterface is called 2.1 to indicate that it is subinterface 1 of serial interface 2. The new prompt `Router(config-subif)#` indicates subinterface configuration mode. The subinterface can be configured to support one or more Frame Relay PVCs. To list the commands available in subinterface configuration mode, enter a question mark (?).

```

Router(config)# interface serial 2
Router(config-if)# encapsulation frame-relay
Router(config-if)# interface serial 2.1
Router(config-subif)# ?
Interface configuration commands:
apollo          Apollo interface subcommands
appletalk       Appletalk interface subcommands
bandwidth       Set bandwidth informational parameter
bridge-group    Transparent bridging interface parameters
clns            CLNS interface subcommands
decnet          Interface DECnet config commands
delay           Specify interface throughput delay
description     Interface specific description
exit            Exit from interface configuration mode
frame-relay     Set frame relay parameters
ip              Interface Internet Protocol config commands
ipx             Novell interface subcommands
isis            IS-IS commands
iso-igrp        ISO-IGRP interface subcommands
no              Negate a command or set its defaults
ntp             Configure NTP
shutdown        Shutdown the selected interface
    
```

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

To exit subinterface configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, press **Ctrl-Z**.

Controller Configuration Mode

You can configure channelized T1 in the controller configuration mode.

To access and list the controller configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, configure channelized T1.	controller t1 slot/port ¹
Step 2 List the controller configuration commands.	?

1. This command is documented in the “Interface Commands” chapter in the *Router Products Command Reference* publication.

In the following example, channelized T1 is being configured on interface 0/0. The new prompt Router(config-controller)# indicates controller configuration mode.

```
Router(config)# controller t1 0/0
Router(config-controller)# ?
Controller configuration commands:
  channel-group  Specify the timeslots to channel-group mapping for an
                  interface
  clocksource    Specify the clock source for a DS1 link
  exit           Exit from controller configuration mode
  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
  shutdown       Shut down a DS1 link (send Blue Alarm)
```

Note The controller configuration mode applies only to the Cisco 7000 series MultiChannel Interface Processor (MIP) that has one or two CxBus Channelized T1 (CxCT1) port adaptor modules attached.

To exit controller configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Hub Configuration Mode

Hub configuration commands configure hub functionality for an Ethernet interface on the Cisco 2500. They always follow a **hub** global configuration command. To access and list the **hub** configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, use the hub command.	hub number port [port] ¹
Step 2 List the hub configuration commands.	?

1. This command is documented in the “Interface Configuration Commands” chapter in the *Router Products Command Reference* publication.

The following example shows how to enter **hub** configuration mode and list the hub configuration commands. In this example, the new prompt `Router(config-hub)#` indicates hub configuration mode.

```
Router(config)# hub ethernet 0 1 3
Router(config-hub)# ?
Hub configuration commands:
  auto-polarity  Enable automatic receiver polarity reversal
  exit           Exit from hub configuration mode
  help          Description of the interactive help system
  link-test     Enable Link Test Function of Hub port
  no            Negate or set default values of a command
  shutdown      Shutdown the selected port
  source-address Enable Source Address control for Hub port
```

To exit hub configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Map-List Configuration Mode

The Asynchronous Transfer Mode (ATM) interface in the Cisco router supports a static mapping scheme that identifies the ATM address of remote hosts or routers. For a listing of which Cisco platforms support ATM, see the appendix “Platform Support,” in the *Router Products Command Reference* publication.

Map-list configuration commands configure a map list. They always follow a **map-list** global configuration command. To access and list the map list configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, use the map-list command.	map-list name ¹
Step 2 List the map-list configuration commands.	?

1. This command is documented in the “ATM Configuration Commands” chapter in the *Router Products Command Reference* publication.

The following example shows how to enter map-list configuration mode and list the map list configuration commands. In this example, the static map-list configuration commands are listed. The new prompt `Router(config-map-list)#` indicates map-list configuration mode.

```
Router(config)# map-list atm
Router(config-map-list)# ?
Static maps list configuration commands:
  A.B.C.D      Protocol specific address
  aarp         AppleTalk ARP
  apollo       Apollo Domain
  appletalk    AppleTalk
  arp          IP ARP
  bridge       Bridging
  clns         ISO CLNS
  clns_es      ISO CLNS End System
  clns_is      ISO CLNS Intermediate System
  cmns         ISO CMNS
  compressedtcp Compressed TCP
  decnet       DECnet
  decnet_node  DECnet Node
  decnet_prime_router DECnet Prime Router
  decnet_router DECnet Router
```

exit-class	Exit from static map class configuration mode
help	Description of the interactive help system
ip	IP
ipx	Novell IPX
no	Negate or set default values of a command
pad	PAD links
rsrb	Remote Source-Route Bridging
stun	Serial Tunnel
vines	Banyan VINES
xns	Xerox Network Services

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

To exit map-list configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Map-Class Configuration Mode

The ATM interface allows you to specify Quality of Service (QOS) parameters that control how much traffic the source router will be sending over a switched virtual circuit (SVC).

To define QOS parameters that are associated with a static map for an SVC, use the **map-class** global configuration command.

Task	Command
Step 1 From global configuration mode, configure a map class.	map-class encapsulation <i>class-name</i> ¹
Step 2 List the map-class configuration commands.	?

1. This command is documented in the “ATM Configuration Commands” chapter in the *Router Products Command Reference* publication.

In the following example, the static map-class configuration commands are listed. The prompt Router(config-map-class)# indicates map-class configuration mode.

```
Router(config)# map-class atm aaa
Router(config-map-class)# ?
Static maps class configuration commands:
atm          Configure atm static map class
exit-class   Exit from static map class configuration mode
help         Description of the interactive help system
no           Negate or set default values of a command
```

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

To exit map-class configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Line Configuration Mode

Line configuration commands modify the operation of a terminal line. Line configuration commands always follow a **line** command, which defines a line number. These commands are generally used to connect to remote routers, change terminal parameter settings either on a line-by-line basis or for a

range of line, and set up the auxiliary port modem configuration to support dial-on-demand routing (DDR) (see the “DDR Commands” chapter in the *Router Products Command Reference* publication).

To access and list the console port, auxiliary port, physical terminal (if installed), and virtual terminal line configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, configure an auxiliary, console, or virtual terminal line.	line {aux con vty} line-number [ending-line-number]¹
Step 2 List the line configuration commands.	?

1. This command is documented in the “Terminal Lines and Modem Support Commands” chapter in the *Router Products Command Reference* publication.

The following example shows how to enter line configuration mode for virtual terminal line 3 and list the line configuration commands. The new prompt `Router(config-line)#` indicates line configuration mode.

```

Router(config)# line vty 0 4<CR>
Router(config-line)# ?
Line configuration commands:
  access-class           Filter connections based on an IP access list
  activation-character    Define the activation character
  autobaud               Set line to autobaud
  autocommand            Automatically execute an EXEC command
  autohangup            Automatically hangup when last connection closes
  autohost               Automatically connect to a host
  cts-required           Require CTS on line
  data-character-bits    Size of characters being handled
  databits               Set number of data bits per character
  disconnect-character    Define the disconnect character
  dispatch-character     Define the dispatch character
  dispatch-timeout       Set the dispatch timer
  editing                Enable command line editing
  escape-character       Change the current line's escape character
  exec                   Start an EXEC process
  exec-banner            Enable the display of the EXEC banner
  exec-character-bits    Size of characters to the command exec
  exec-timeout           Set the EXEC timeout
  exit                   Exit from line configuration mode
  flowcontrol            Set the flow control
  help                   Description of the interactive help system
  history                Enable the command history function
  hold-character         Define the hold character
  length                 Set number of lines on a screen
  location               Enter terminal location description
  lockable               Allow users to lock a line
  login                  Enable password checking
  modem                  Configure the Modem Control Lines
  monitor                Copy debug output to the current terminal line
  no                     Negate a command or restore its defaults
  notify                 Inform users of output from concurrent sessions
  padding                Set padding for a specified output character
  parity                 Set terminal parity
  password               Set a password
  private                Configuration options that user can set will remain in effect
                        between terminal sessions
  refuse-message         Define a refuse banner
  rotary                 Add line to a rotary group
  rxspeed                Set the receive speed
  session-limit          Set maximum number of sessions

```

session-timeout	Set interval for closing connection when there is no input traffic
special-character-bits	Size of the escape (and other special) characters
speed	Set the transmit and receive speeds
start-character	Define the start character
stop-character	Define the stop character
stopbits	Set async line stop bits
telnet	Telnet protocol-specific configuration
telnet-transparent	Send a CR as a CR followed by a NULL instead of a CR followed by a LF
terminal-type	Set the terminal type
transport	Define transport protocols for line
txspeed	Set the transmit speeds
vacant-message	Define a vacant banner
width	Set width of the display terminal

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

To exit line configuration mode and return to global configuration mode, use the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Router Configuration Mode

Router configuration commands configure an IP routing protocol and always follow a **router** command. To access and list the router configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, enter router configuration mode.	router <i>[keyword]</i> ¹ See the list in the example for keywords.
Step 2 List the router configuration commands.	?

1. This command is documented in the “IP Routing Protocols Commands” chapter in the *Router Products Command Reference* publication.

To list the available router configuration keywords, enter the **router** command followed by a space and a question mark (?) at the global configuration prompt:

```
Router(config)# router ?
bgp      Border Gateway Protocol (BGP)
egp      Exterior Gateway Protocol (EGP)
igrp     Interior Gateway Routing Protocol (IGRP)
isis     ISO IS-IS
iso-igrp IGRP for OSI networks
ospf     Open Shortest Path First (OSPF)
rip      Routing Information Protocol (RIP)
static   Static CLNS Routing
```

In the following example, the router is configured to support the Routing Information Protocol (RIP). The new prompt is Router(config-router)#.

```
Router(config)# router rip
Router(config-router)# ?
router configuration commands:
default-information Control distribution of default information
default-metric      Set metric of redistributed routes
distance            Define an administrative distance
distribute-list     Filter networks in routing updates
exit                Exit from routing protocol configuration mode
help                Description of the interactive help system
neighbor            Specify a neighbor router
```

network	Enable routing on an IP network
no	Negate or set default values of a command
offset-list	Add or subtract offset from IGRP, RIP, or HELLO metrics
passive-interface	Suppress routing updates on an interface
redistribute	Redistribute information from another routing protocol
timers	Adjust routing timers

The list of commands might vary slightly from this example, depending on the software feature set and configuration of your router.

To exit router configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

IPX-Router Configuration Mode

Internet Packet Exchange (IPX) is a Novell network-layer protocol. To access and list the IPX routing configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, enter IPX-router configuration mode.	ipx router [keyword] ¹ See the Novell IPX chapter for keywords.
Step 2 List the IPX-router configuration commands.	?

1. This command is documented in the “Novell IPX Commands” chapter in the *Router Products Command Reference* .

In the following example, IPX RIP routing is configured. The new prompt is Router (config-ipx-router)#.

```
Router(config)# ipx router rip <CR>
Router(config-ipx-router)# ?
Novell router configuration commands:
  distribute-list  Filter networks in routing updates
  exit            Exit from IPX routing protocol configuration mode
  help           Description of the interactive help system
  network        Enable routing on an IPX network
  no             Negate or set default values of a command
  redistribute    Enable routing protocol redistribution
```

To exit IPX-router configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

Route-Map Configuration Mode

Use the route-map configuration mode to configure routing table and source and destination information. To access and list the **route-map** configuration commands, complete the following tasks:

Task	Command
Step 1 From global configuration mode, enter route-map configuration mode.	route-map [map-tag] ¹
Step 2 List the route-map configuration commands.	?

1. This command is documented in the “IP Routing Protocols Commands” chapter in the *Router Products Command Reference* publication.

In the following example, a route map named `arizona1` is configured. The new prompt is `Router(config-route-map)#`. Enter a question mark (?) to list **route-map** configuration commands.

```
Router(config)# route-map arizona1 <CR>
Router(config-route-map)# ?
Route Map configuration commands:
  exit  Exit from route-map configuration mode
  help  Description of the interactive help system
  match Match values from routing table
  no    Negate or set default values of a command
  set   Set values in destination routing protocol
```

To exit route-map configuration mode and return to global configuration mode, enter the **exit** command. To exit configuration mode and return to privileged EXEC mode, use the **end** command or press **Ctrl-Z**.

ROM Monitor Mode

If your router does not find a valid system image, or if you interrupt the boot sequence, the system might enter read-only memory (ROM) monitor mode. From ROM monitor mode, you can boot the router or perform diagnostic tests.

From the Cisco 2000, Cisco 3000, and Cisco 4000, you can also enter ROM monitor mode by entering the **reload** EXEC command and then pressing the Break key during the first 60 seconds of startup. To save changes to the configuration file, use the **copy running-config startup-config** command before issuing the **reload** command.

To access and list the ROM monitor configuration commands, complete the following tasks:

Task	Command
Enter ROM monitor mode from privileged EXEC mode.	reload ¹ Press Break during the first 60 seconds while the system is booting.
List the ROM monitor commands.	?

1. This command is documented in the “System Image, Microcode Image, and Configuration File Load Commands” chapter of the *Router Products Command Reference* publication.

The ROM monitor prompt is the angle bracket (>):

```
> ?
$ state      Toggle cache state (? for help)
B [filename] [TFTP Server IP address | TFTP Server Name]
              Load and execute system image from ROM or from TFTP server
C [address]  Continue execution [optional address]
D /S M L V   Deposit value V of size S into location L with modifier M
E /S M L     Examine location L with size S with modifier M
G [address]  Begin execution
H           Help for commands
I           Initialize
K           Stack trace
L [filename] [TFTP Server IP address | TFTP Server Name]
              Load system image from ROM or from TFTP server, but do not
              begin execution
O           Show configuration register option settings
P           Set the break point
```

S Single step next instruction
T function Test device (? for help)
Deposit and Examine sizes may be B (byte), L (long) or S (short).
Modifiers may be R (register) or S (byte swap).
Register names are: D0-D7, A0-A6, SS, US, SR, and PC

To return to user EXEC mode, type **continue**. To initialize the router, enter the **i** command. This causes the bootstrap program to reinitialize the hardware, clear the contents of memory, and boot the system. Depending on the setting of the config-register, it may also boot the system. (It is best to run the **i** command prior to running any tests or booting software.) To boot the system image file, use the **b** command (described in the “System Image, Microcode Image, and Configuration File Load Commands” chapter in the *Router Products Command Reference* publication). For details on ROM monitor mode commands, refer to the appropriate hardware installation guide.

APPN Command Modes

Advanced Peer-to-Peer Networking (APPN) is the second generation of SNA. APPN provides support for client/server applications and offers more dynamics than traditional hierarchical SNA, such as dynamic directory and routing services.

APPN offers the ability to define attributes of the APPN network that can become quite complex. To easily manage the capability to define the details of APPN, special configuration command modes and conventions have been developed.

Because APPN offers a large number of configuration options, specific configuration dialogues are used for each major APPN configuration task. When you define the major item, you will automatically enter the detailed configuration mode for that item. There are two options to exit the detailed mode. The “complete” command exits the detailed configuration mode and updates the APPN subsystem with the changes. The “exit” command leaves the definition in “no complete” state and does not update the APPN subsystem.

Define an APPN Control Point

An APPN control point definition is required to use APPN. This definition additively the fully-qualified control point name for the node, which is a combination of a network identifier and a CP name. The network identifier (NETID) must be the same as other network nodes in the APPN subnetwork attached to this node. The CP name identifies this node uniquely within the particular subnetwork

To enter APPN Control point mode, follow these tasks.

Task	Command
Define an APPN Control Point	appn control-point <i>NETID.CPNAME</i>

Performing this task takes you from global configuration mode into APPN CONTROL POINT mode. From this mode, you can perform any of the following optional definition tasks which identify various capabilities and attributes of the control point.

The following commands allow for the addition, removal, or completion of configuration items within the APPN Control Point mode.

Task	Command
Negate or restore the default value for a command mode	no command

Task	Command
Complete the APPN command mode, return to global configuration mode, and update the APPN subsystem	complete
Allow modifications to a previously completed APPN command modes,	no complete
Exit APPN command mode dialog without completing the definition and without updating the APPN subsystem.	exit

Define an APPN Port

If you plan to use APPN over a serial interface, the interface must be configured to a serial encapsulation type supported by APPN. The following encapsulations are supported: SDLC, Frame Relay, and X25.

An APPN port definition is used to associate APPN capabilities with a specific interface APPN will use. Each interface that will be used for APPN communications requires an APPN port definition statement. A port can be associated with a specific interface by performing the following configuration task:

Task	Command
Define an APPN Port associated with a interface	appn port <i>portname interface</i>

Performing this task takes you from global configuration mode into APPN Port mode.

To exit APPN Port configuration, see the exit commands under the section, “Define an APPN Control Point.”

Define an APPN Link Station

A link station is a representation of the connection or potential connection to another node. You must define a link station if you want this node to initiate APPN connections with other nodes. In addition, you may define a link station to specify attributes of an APPN connection regardless of which node initiates the connection.

Task	Command
Define an APPN Logical Link.	appn link-station <i>linkname</i>

Performing this task takes you from global configuration mode into APPN Logical Link mode.

To exit APPN Link Station configuration, see the exit commands under the section, “Define an APPN Control Point.”

Define an APPN Connection Network

An APPN connection network allows nodes on the same shared media to connect directly, even if there is no APPN link defined between them. Connection networks can be used to provide any to any connectivity on a shared media without the need to define any to any link station connectivity. When a route is calculated through a connection network, a dynamic link station will be built and a

connection will be established between the nodes on each side of the connection network. You must configure the same connection network name at each node that will participate in the connection network.

To indicate that this node is a member of a specific connection network, perform the following task from global configuration mode:

Task	Command
Define an APPN connection network.	appn connection-network <i>netid.cnname</i>

Performing this task takes you from global configuration mode into APPN Connection Network mode.

To exit APPN Connection Network configuration, see the exit commands under the section, “Define an APPN Control Point.”

Define an APPN Class of Service

Cisco provides standard predefined APPN class of service definitions that are commonly used in APPN networks. These are #BATCH, #BATCHSC, #CONNECT, #INTER, #INTERSC, SNASVCMG, CPSVCMG. You can define an APPN class of service or modify the predefined definitions. Each class of services definition must have between one and eight node rows, between one and eight tg rows, as well as a transmission priority to be used for this class of service.

To define a class of service issue the **appn class-of-service** command from global configuration mode.

Task	Command
Define an APPN Class of Service.	appn class-of-service <i>cosname</i>

Performing this task takes you from global configuration mode into APPN Class of Service mode.

To exit APPN Class of Service configuration, see the exit commands under the section, “Define an APPN Control Point.”

Define an APPN Mode

An APPN mode definition is used by a network node to associate a mode name received on an APPN search or session request with a class of service known to this node. Most APPN nodes will supply the class of service to their network node server, so mode definition may not be required in many APPN networks. However, if this node is providing network node services to an end node that does not supply a class of service, or this node is providing network node services for a LEN node, mode definitions may be required for each mode that is used by the partner node.

Cisco provides standard predefined mode definitions for modes that are commonly used in an APPN network. The predefined mode names are the blank mode, #BATCH, #BATCHSC, #INTER, #INTERSC, CPSVCMG, SNASVCMG. You can change a predefined mode or define a new mode. To define an APPN mode, perform the following task in global configuration mode:

Task	Command
Define an APPN Mode.	appn mode <i>modename</i>

Performing this task takes you from global configuration mode into APPN MODE configuration mode. Within this mode, you must assign a class of service to the mode definition

To exit APPN Mode configuration, see the exit commands under the above section, “Define an APPN Control Point.”

Define an APPN Partner LU Location

The APPN directory stores names of resources and their owners. Usually this information is learned dynamically via APPN searches. However, you may wish to manually define the location of specific resources. Doing so can improve network performance by allowing directed APPN searches to travel straight to the owning CP, without the need for an initial broadcast search for the resource. However, APPN is known for its dynamic capabilities, not its need for system definition. For this reason, and for easier manageability, it is good practice to define location names only when necessary.

To define a partner LU location, perform the following task in global configuration mode:

Task	Command
Specify the partner resource name.	appn partner-lu-location <i>netid.name</i>

Performing this task takes you from the global configuration mode into the APPN Partner LU Location mode.

To exit APPN Partner LU Location configuration, see the exit commands under the section, “Define an APPN Control Point.”

Start the APPN Subsystem

The APPN subsystem may be started via global configuration mode or privileged EXEC mode.

Task	Command
Start the APPN subsystem from global configuration mode. Provide this configuration is saved, the APPN subsystem will start each time the router is booted.	appn routing
Start the APPN subsystem from privileged EXEC mode without affecting the current configuration.	appn start

Stop the APPN Subsystem

The APPN subsystem may be stopped via global configuration mode or privileged EXEC mode.

Task	Command
Deactivate APPN routing from global configuration mode and remove it from the current configuration.	no appn routing
Deactivate APPN routing from privileged EXEC mode without affecting the current configuration.	appn stop

IBM Channel Attach Command Modes

The Cisco 7000 series configured with a Channel Interface Processor (CIP), supports the IBM channel attach feature. This configuration is an ideal connectivity hub for large corporate networks, providing routing services between mainframes and LANs.

Before you configure your channel attach interface, you must select an interface. The following mode is only valid for port 2 on a CIP board. Ports 0 and 1 represent real, physical ports. Port 2 is an internal, virtual port.

Complete the following task in global configuration mode:

Task	Command
From global configuration mode enter interface configuration mode	interface channel <i>slot/port</i> ¹

1. This command is documented in the “Configuring IBM Channel Attach” chapter.

This takes you from global configuration mode into interface configuration mode.

To configure an internal LAN on a CIP interface, complete the following task in interface configuration mode:

Task	Command
From global configuration mode enter internal LAN configuration mode	lan [ethernet tokenring fdi] <i>lan-id</i> ¹

1. This command is documented in the “Configuring IBM Channel Attach” chapter.

This takes you from interface configuration mode into internal lan configuration mode.

An internal LAN can only be configured on CIP interface port 2, which represents an internal port on the CIP.

To configure an internal adapter interface on an internal LAN, complete the following task in internal LAN configuration mode:

Task	Command
From global configuration mode enter internal adapter configuration mode	adapter <i>adapter-number mac-address</i> ¹

1. This command is documented in the “Configuring IBM Channel Attach” chapter.

To configure an internal adapter interface, you must first use the **bridge-group** internal LAN configuration command or the source-bridge internal LAN configuration command to configure bridging type. These commands are documented in the “Source-Route Bridging Commands” chapter of the *Router Products Command Reference* publication.

Get Context-Sensitive Help

The previous sections described the first level of help available with the user interface. 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 arguments, perform one of the following tasks:

Task	Command
Obtain a brief description of the help system in any command mode.	help
Configure a line or lines to receive help for the full set of user-level commands when a user presses ?.	full-help
Configure a line to receive help for the full set of user-level commands for this exec session.	terminal full-help ¹
Obtain a list of commands that begin with a particular character string.	<i>abbreviated-command-entry?</i>
Complete a partial command name.	<i>abbreviated-command-entry</i> <Tab>
List all commands available for a particular command mode.	?
List a command's associated keywords.	<i>command ?</i>
List a keyword's associated arguments.	<i>command keyword ?</i>

1. This command is documented in the *Cisco Access Connection Guide*.

When using context-sensitive help, the space (or lack of a space) before the question mark (?) is significant. 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. This form of help is called *word help*, because it completes a word for you.

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

You can abbreviate commands and keywords to the number of characters that allow a unique abbreviation. For example, you can abbreviate the **show** command to **sh**.

Enter the **help** command (which is available in any command mode) for a brief description of the help system:

```
Router# help
Help may be requested at any point in a command by entering
a question mark '?'. If nothing matches, the help list will
be empty and you must back up until entering a '?' shows the
available options.
Two styles of help are provided:
1. Full help is available when you are ready to enter a
   command argument (e.g. 'show ?') and describes each possible
   argument.
2. Partial help is provided when an abbreviated argument is entered
   and you want to know what arguments match the input
   (e.g. 'show pr?'.)
```

As described in the **help** command output, you can enter a partial command name and a question mark (?) to obtain a list of commands beginning with a particular character set. See “Complete a Partial Command Name” later in this chapter for more detail.

The following example illustrates how the context-sensitive help feature enables you to create an access list from configuration mode. First enter the letters **co** at the system prompt followed by a question mark (?). Do not leave a space between the last letter and the question mark (?). The system provides the commands that begin with **co**.

```
Router# co?
configure connect copy
```

Enter the **configure** command followed by a space and a question mark (?) to list the command's keywords and a brief explanation:

```
Router# configure ?
memory    Configure from NV memory
network   Configure from a TFTP network host
terminal  Configure from the terminal
<cr>
```

Enter the **terminal** keyword to enter configuration mode from the terminal:

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

Enter the **access-list** command followed by a space and a question mark (?) to list the command's keywords:

```
Router(config)# access-list ?
<1-99>    IP standard access list
<100-199> IP extended access list
<1000-1099> IPX SAP access list
<1100-1199> Extended 48-bit MAC address access list
<200-299> Protocol type-code access list
<300-399> DECnet access list
<400-499> XNS standard access list
<500-599> XNS extended access list
<600-699> Appletalk access list
<700-799> 48-bit MAC address access list
<800-899> IPX standard access list
<900-999> IPX extended access list
```

Enter the access list number **99** and then enter another question mark (?) to see the arguments that apply to the keyword and brief explanations:

```
Router(config)# access-list 99 ?
deny    Specify packets to reject
permit  Specify packets to forward
```

Enter the **deny** argument followed by a question mark (?) to list additional options:

```
Router(config)# access-list 99 deny ?
A.B.C.D Address to match
```

Enter the IP address followed by a question mark (?) to list additional options:

```
Router(config)# access-list 99 deny 131.108.134.0 ?
A.B.C.D Mask of bits to ignore
<cr>
```

The <cr> symbol appears in the list, indicating that one of your options is to press Return to execute the command. The other option is to add a wildcard mask. Enter the wildcard mask followed by a question mark (?) to list further options.

```
Router(config)# access-list 99 deny 131.108.134.0 0.0.0.255 ?
<cr>
```

```
Router(config)# access-list 99 deny 131.108.134.0 0.0.0.255
```

The <cr> symbol by itself indicates there are no more keywords or arguments. Press Return to execute the command. The system adds an entry to access list 99 that denies access to all hosts on subnet 131.108.134.0.

Check Command Syntax

The user interface provides error isolation in the form of an error indicator (^). The ^ symbol appears at the point in the command string where you have entered an incorrect command, keyword, or argument. The error location indicator and interactive help system allow you to easily find and correct syntax errors.

In the following example, suppose you want to set the router clock. First, use context-sensitive help to check the syntax for setting the clock.

```
Router# clock ?
      set Set the time and date
Router# clock
```

The help output shows that the **set** keyword is required. Next, check the syntax for entering the time:

```
Router# clock set ?
hh:mm:ss Current time
Router# clock set
```

Enter the current time:

```
Router# clock set 13:32:00
% Incomplete command.
```

The system indicates that you need to provide additional arguments to complete the command. Press **Ctrl-P** (see the next section, “Use the Command History Features”) to automatically repeat the previous command entry. Then add a space and question mark (?) to reveal the additional arguments:

```
Router# clock set 13:32:00 ?
<1-31> Day of the month
January Month of the year
February
March
April
May
June
July
August
September
October
November
December
```

Now you can complete the command entry:

```
Router# clock set 13:32:00 23 February 93
                                     ^
% Invalid input detected at '^' marker.
```

The caret symbol (^) and help response indicate an error at 93. To list the correct syntax, enter the command up to the point where the error occurred and then enter a question mark (?):

```
Router# clock set 13:32:00 23 February ?
<1993-2035> Year
Router# clock set 13:32:00 23 February
```

Enter the year using the correct syntax and press Return to execute the command.

```
Router# clock set 13:32:00 23 February 1993
```

Use the Command History Features

With the current software release, the user interface provides a history or record of commands you have entered. This feature is particularly useful for recalling long or complex commands or entries, including access lists. With the command history feature, you can complete the tasks in the following sections:

- Set the Command History Buffer Size
- Recall Commands
- Disable the Command History Feature

Set the Command History Buffer Size

By default, the system records ten command lines in its history buffer. To set the number of command lines the system will record during the current terminal session, complete the following task in EXEC mode:

Task	Command
Enable the command history feature for the current terminal session.	terminal history [size number-of-lines] ¹

1. This command is documented in the *Cisco Access Connection Guide*.

The **terminal no history size** command resets the number of lines saved by history to the default of 10 lines.

To configure the number of command lines the system will record, complete the following task in line configuration mode:

Task	Command
Enable the command history feature.	history [size number-of-lines] ¹

1. The **no history** command turns off command history for the line.

Recall Commands

To recall commands from the history buffer, perform one of the following tasks:

Task	Key Sequence/Command
Recall commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.	Press Ctrl-P or the up arrow key. ¹
Return to more recent commands in the history buffer after recalling commands with Ctrl-P or the up arrow key. Repeat the key sequence to recall successively more recent commands.	Press Ctrl-N or the down arrow key. ¹
While in EXEC mode, list the last several commands you have just entered.	show history

1. The arrow keys function only on ANSI-compatible terminals such as VT100s.

Disable the Command History Feature

The command history feature is automatically enabled. To disable it during the current terminal session, complete the following task in EXEC mode:

Task	Command
Disable the command history feature for the current session.	terminal no history ¹

1. This command is documented in the *Cisco Access Connection Guide*.

To configure a specific line so that the command history feature is disabled, complete the following task in line configuration mode:

Task	Command
Configure the line so that the command history feature is disabled.	no history

Use the Editing Features

The current software release includes an enhanced editing mode that provides a set of editing key functions similar to those of the Emacs editor.

You can enter commands in uppercase, lowercase, or a mix of both. Only passwords are case sensitive. You can abbreviate commands and keywords to the number of characters that allow a unique abbreviation. For example, you can abbreviate the **show** command to **sh**. After entering the command line at the system prompt, press the Return key to execute the command.

The following subsections are included in this section:

- Enable Enhanced Editing Mode
- Move Around on the Command Line
- Complete a Partial Command Name
- Paste in Buffer Entries
- Edit Command Lines that Wrap
- Delete Entries
- Scroll Down a Line or a Screen
- Redisplay the Current Command Line
- Transpose Mistyped Characters
- Control Capitalization
- Designate a Keystroke as a Command Entry
- Disable Enhanced Editing Mode

Enable Enhanced Editing Mode

Although enhanced editing mode is automatically enabled with the current software release, you can disable it and revert to the editing mode of previous software releases. See the section “Disable Enhanced Editing Mode” later in this chapter.

To reenable the enhanced editing mode for the current terminal session, complete the following task in EXEC mode:

Task	Command
Enable the enhanced editing features for the current terminal session.	terminal editing ¹

1. This command is documented in the *Cisco Access Connection Guide*.

To reconfigure a specific line to have enhanced editing mode, complete the following task in line configuration mode:

Task	Command
Enable the enhanced editing features.	editing

Move Around on the Command Line

Perform the following tasks to move the cursor around on the command line for corrections or changes:

Task	Keystrokes
Move the cursor back one character.	Press Ctrl-B or press the left arrow key. ¹
Move the cursor forward one character.	Press Ctrl-F or press the right arrow key. ¹
Move the cursor to the beginning of the command line.	Press Ctrl-A .
Move the cursor to the end of the command line.	Press Ctrl-E .
Move the cursor back one word.	Press Esc B .
Move the cursor forward one word.	Press Esc F .

1. The arrow keys function only on ANSI-compatible terminals such as VT100s.

Complete a Partial Command Name

If you cannot remember a complete command name, you can use the Tab key to allow the system to complete a partial entry. To do so, perform the following task:

Task	Keystrokes
Complete a command name.	Enter the first few letters and press the Tab key.

If your keyboard does not have a Tab key, press **Ctrl-I** instead.

In the following example, when you enter the letters **conf** and press the Tab key, the system provides the complete command:

```
Router# conf<Tab>  
Router# configure
```

If you enter a set of characters that could indicate more than one command, the system beeps to indicate an error. Enter a question mark (?) to obtain a list of commands that begin with that set of characters. Do not leave a space between the last letter and the question mark (?).

For example, there are three commands in privileged mode that start with `co`. To see what they are, type `co?` at the privileged EXEC prompt:

```
Router# co?
configure connect copy
Router# co
```

Paste in Buffer Entries

The system provides a buffer that contains the last ten items you deleted. You can recall these items and paste them in the command line by performing the following task:

Task	Keystrokes
Step 1 Recall the most recent entry in the buffer.	Press Ctrl-Y .
Step 2 Recall the next buffer entry.	Press Esc Y .

The buffer contains only the last ten items you have deleted or cut. If you press **Esc Y** more than ten times, you will cycle back to the first buffer entry.

Edit Command Lines that Wrap

The new editing command set provides a wraparound feature for commands that extend beyond a single line on the screen. When the cursor reaches the right margin, the command line shifts ten spaces to the left. You cannot see the first ten characters of the line, but you can scroll back and check the syntax at the beginning of the command. To scroll back, perform the following task:

Task	Keystrokes
Return to the beginning of a command line to verify that you have entered a lengthy command correctly.	Press Ctrl-B or the left arrow key repeatedly until you scroll back to the beginning of the command entry, or press Ctrl-A to return directly to the beginning of the line. ¹

1. The arrow keys function only on ANSI-compatible terminals such as VT100s.

In the following example, the **access-list** command entry extends beyond one line. When the cursor first reaches the end of the line, the line is shifted ten spaces to the left and redisplayed. The dollar sign (\$) indicates that the line has been scrolled to the left. Each time the cursor reaches the end of the line, the line is again shifted ten spaces to the left.

```
Router(config)# access-list 101 permit tcp 131.108.2.5 255.255.255.0 131.108.1
Router(config)# $ 101 permit tcp 131.108.2.5 255.255.255.0 131.108.1.20 255.25
Router(config)# $t tcp 131.108.2.5 255.255.255.0 131.108.1.20 255.255.255.0 eq
Router(config)# $108.2.5 255.255.255.0 131.108.1.20 255.255.255.0 eq 45
```

When you have completed the entry, press **Ctrl-A** to check the complete syntax before pressing the **Return** key to execute the command. The dollar sign (\$) appears at the end of the line to indicate that the line has been scrolled to the right:

```
Router(config)# access-list 101 permit tcp 131.108.2.5 255.255.255.0 131.108.1$
```

The router assumes you have a terminal screen that is 80 columns wide. If you have a width other than that, use the **terminal width** command to tell the router the correct width of your terminal.

Use line wrapping in conjunction with the command history feature to recall and modify previous complex command entries. See the section “Recall Commands” earlier in this chapter for information about recalling previous command entries.

Delete Entries

Perform any of the following tasks to delete command entries if you make a mistake or change your mind:

Task	Keystrokes
Erase the character to the left of the cursor.	Press the Delete or Backspace key.
Delete the character at the cursor.	Press Ctrl-D .
Delete all characters from the cursor to the end of the command line.	Press Ctrl-K .
Delete all characters from the cursor to the beginning of the command line.	Press Ctrl-U or Ctrl-X .
Delete the word to the left of the cursor.	Press Ctrl-W .
Delete from the cursor to the end of the word.	Press Esc D .

Scroll Down a Line or a Screen

When you use the help facility to list the commands available in a particular mode, the list is often longer than the terminal screen can display. In such cases, a `---More---` prompt is displayed at the bottom of the screen. To view the next line or screen, complete the following tasks:

Task	Keystrokes
Scroll down one line.	Press the Return key.
Scroll down one screen.	Press the Space bar.

Note The `---More---` prompt is used for any output that has more lines than can be displayed on the terminal screen, including **show** command output. You can use the keystrokes listed above whenever you see the `---More---` prompt.

Redisplay the Current Command Line

If you are entering a command and the system suddenly sends a message to your screen, you can easily recall your current command line entry. To do so, perform the following task:

Task	Keystrokes
Redisplay the current command line.	Press Ctrl-L or Ctrl-R .

Transpose Mistyped Characters

If you have mistyped a command entry, you can transpose the mistyped characters by performing the following task:

Task	Keystrokes
Transpose the character to the left of the cursor with the character located at the cursor.	Press Ctrl-T .

Control Capitalization

You can capitalize or lowercase words or capitalize a set of letters with simple keystroke sequences. To do so, perform the following task:

Task	Keystrokes
Capitalizes at the cursor.	Press Esc C .
Change the word at the cursor to lowercase.	Press Esc L .
Capitalize letters from the cursor to the end of the word.	Press Esc U .

Designate a Keystroke as a Command Entry

Sometimes you might want to use a particular keystroke as an executable command, perhaps as a shortcut. Complete the following task to insert a system code for this purpose:

Task	Keystrokes
Insert a code to indicate to the system that the keystroke immediately following should be treated as a command entry, <i>not</i> an editing key.	Press Ctrl-V or Esc Q .

Disable Enhanced Editing Mode

To disable enhanced editing mode and revert to the editing mode of software releases before 9.21, perform the following task in EXEC mode:

Task	Command
Disable the enhanced editing features for the local line.	terminal no editing ¹

1. This command is documented in the *Cisco Access Connection Guide*.

You might want to disable enhanced editing if you have prebuilt scripts; for example, scripts that do not interact well when enhanced editing is enabled. You can reenable enhanced editing mode with the **terminal editing** command.

The editing keys and functions of software releases before 9.21 are listed in Table 2-2.

Table 2-2 Editing Keys and Functions for Software Release 9.1 and Earlier

Key	Function
Delete or Backspace	Erases the character to the left of the cursor.
Ctrl-W	Erases a word.
Ctrl-U	Erases a line.
Ctrl-R	Redisplays a line.
Ctrl-Z	Ends configuration mode and returns to the EXEC prompt.
Return	Executes single-line commands.

End a Session

After using the **setup** command or other configuration commands, exit the router and quit the session.

To end a session, perform the following steps:

Task	Command
Enter the quit EXEC command.	quit

Refer to the *Cisco Access Connection Guide* for more information on exiting sessions and closing connections.

Use the Cisco Web Browser Interface to Issue Commands

You can issue most of the Cisco IOS commands using a Web browser. This Cisco IOS feature is accessed by using the Cisco Web browser interface, which is accessed from the router's home page. (All Cisco routers and access servers loaded with the latest version of Cisco IOS software have a home page, which is password protected.)

From the router's home page, you click on a hypertext link titled "Monitor the Router." This link takes you to a Web page that has a "Command" field. You can type commands in this field as if you were entering commands at a terminal connected to the router. The page also displays a list of commands. You can execute these commands by clicking on them, as if you were clicking on hypertext links.

Use the Cisco Web Browser Interface to Issue Commands Task List

To use the Cisco Web browser interface to issue commands, perform the tasks in the following list:

- Configure the Cisco Web Browser Interface
- Use the Correct Hardware and Software
- Access Your Router's Home Page
- Issue Commands Using the Cisco Web Browser Interface
 - Enter Commands Using Hypertext Links
 - Enter Commands Using the Command Field
 - Enter Commands Using the URL Window

Configure the Cisco Web Browser Interface

You can enable the Cisco Web browser interface on any router running Cisco IOS Release 11.0(6) or later software. Once enabled, you will be able to issue Cisco IOS commands to your router using a Web browser.

The Web browser interface is automatically enabled when you use ClickStart to configure a Cisco 1003, Cisco 1004, or Cisco 1005 router.

If you have any other Cisco router, you must enable the Web browser interface by altering the routers' configuration. To do this, perform the tasks in the following list. The first task is required; the remaining are optional.

- Enable the Cisco Web browser interface
- Change the Cisco Web Browser Interface Port Number
- Control Access to the Cisco Web Browser Interface

Enable the Cisco Web Browser Interface

To enable a Cisco router to be configured from a browser using the Cisco Web browser interface, perform the following task in global configuration mode:

Task	Command
Enable a router to be reconfigured using the Cisco Web browser interface.	ip http server

Now that the Cisco Web browser interface is enabled, you can perform any of the optional tasks or proceed to configure a router using the Cisco Web browser interface.

Change the Cisco Web Browser Interface Port Number

By default, the Cisco Web browser interface uses port 80 on the router. To assign the Cisco Web browser interface to a different port, perform the following task in global configuration mode:

Task	Command
Assign a port number to be used by the Cisco Web browser interface.	ip http port <i>number</i>

Control Access to the Cisco Web Browser Interface

To control which hosts can access the http server used by the Cisco Web browser interface, perform the following task in global configuration mode:

Task	Command
Control access to the http server used by the Cisco Web browser interface.	ip http access-class { <i>access-list-number</i> <i>name</i> }

Use the Correct Hardware and Software

To use the Cisco Web browser interface, your computer must have a World Wide Web browser. The Cisco Web browser interface works with most browsers, including Netscape Navigator. Your Web browser must be able read and submit forms. The original versions of Mosaic might have problems using the Cisco Web browser interface, because they either cannot submit forms or have difficulty doing so.

The computer must be connected to the same network that the router or access server is on.

Access Your Router's Home Page

Perform the following steps to access the home page for your router or access server:

Step 1 Enter the name of the router or access server in the URL field of your Web browser and press return. The browser prompts you for the password for the router or access server.

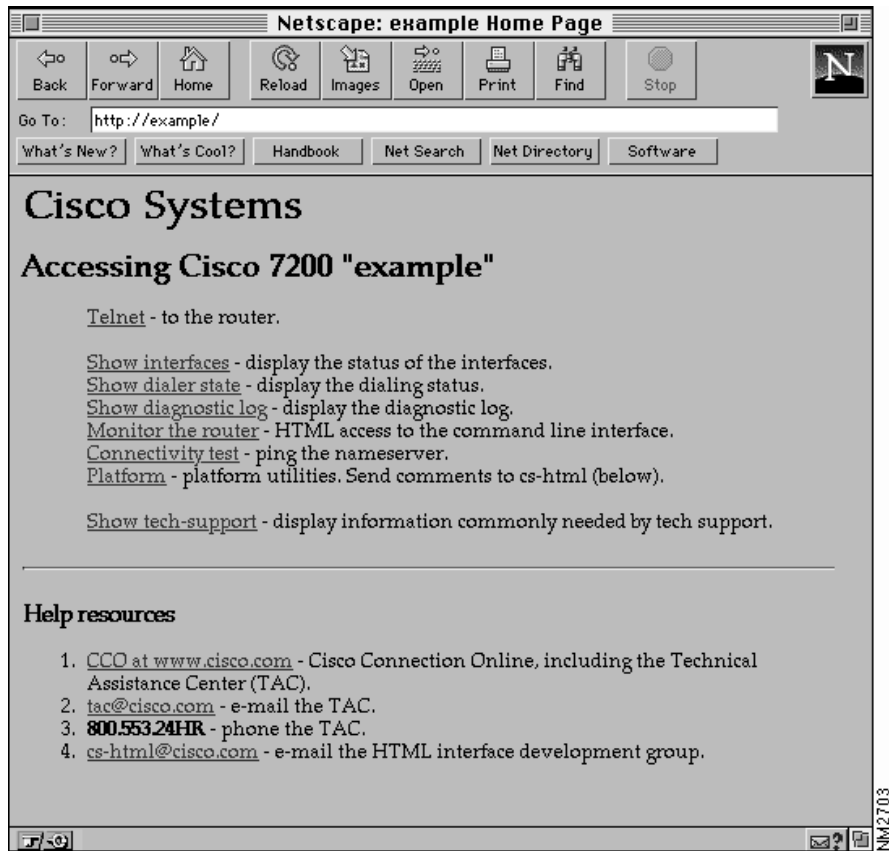
Step 2 Enter the password.

Note The name and password for your router and access server are designated in their configuration. Contact your network administrator if you do not have this information.

The browser should display the home page for your router or access server.

The router's home page looks something like the Cisco 7200 home page shown in Figure 1.

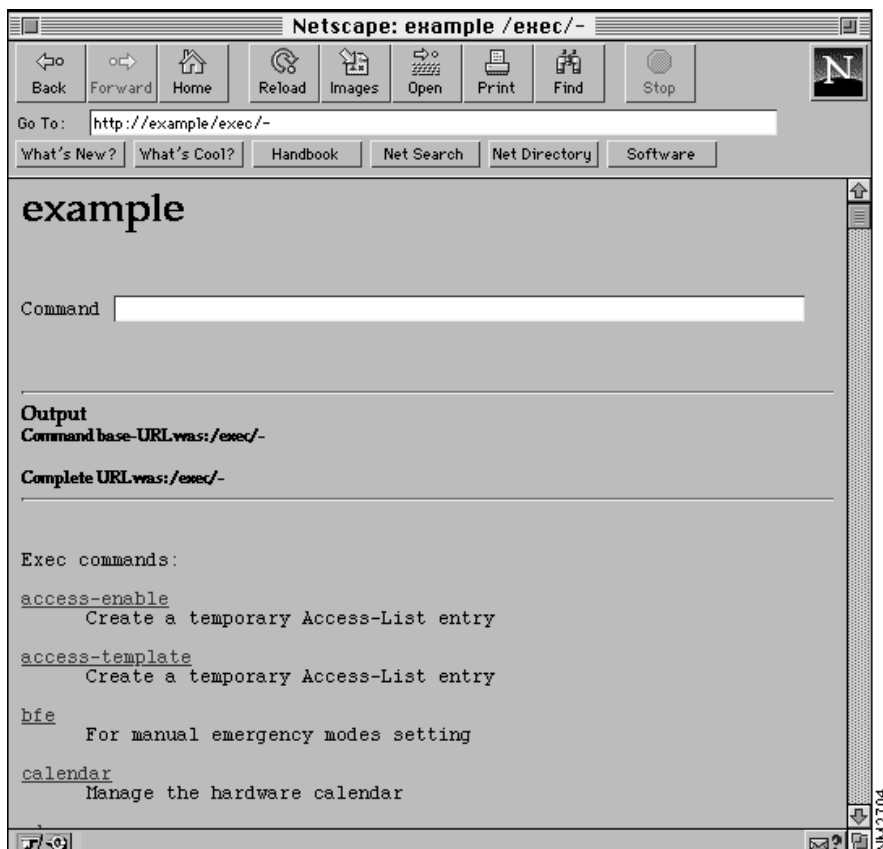
Figure 1 Example of a Home Page for a Cisco 7200



Issue Commands Using the Cisco Web Browser Interface

To issue commands using the Cisco Web browser interface, click the link “Monitor the router” in the first list of hypertext links on the home page. This displays the Web page shown in Figure 2.

Figure 2 The “Command” Field Web Page for a Router Named “example”



Enter Commands Using Hypertext Links

To enter a command using hypertext links, scroll through the commands listed at the bottom of the screen and click the one you want to execute. If the link is a complete command, it is executed. If the command has more parameters, another list of command hypertext links is displayed. Scroll through this second list and click the one you want to execute.

If the command is a request for information, like a **show** command, the information is displayed in the Web browser window.

If the command requires a variable, a form in which you can enter the variable is displayed.

Enter Commands Using the Command Field

Entering the command in the command field is just like entering it at a terminal console. Enter the command using the syntax documented in the Cisco IOS command reference. If you are uncertain of the options available for a particular command, type a ?.

For example, entering **show ?** in the command field displays the parameters for the **show** command. The Cisco Web browser interface displays the parameters as hypertext links. To select a parameter, you can either click on one of the links, or you can enter the parameter in the command field.

Enter Commands Using the URL Window

You can issue a command using the URL window for the Web browser.

For example, to execute a **show configuration** command on a router named “example,” you would enter the following in the URL window:

```
http://example/exec/show/configuration
```

The Web browser then displays the configuration for the “example” router. To save effort, modify the URL in the URL window in the browser control bar instead of retyping the entire URL.

The difference between entering a command in the command field and entering a command in the URL window is that in the URL window command modes and options should be separated by slashes, not spaces.

