



CHAPTER 5

The Command-Line Interface

This chapter provides information and commands concerning the following topics:

- Shortcuts for entering commands
- Using the `(Tab)` key to enter complete commands
- Using the question mark for help
- **enable** command
- **exit** command
- **disable** command
- **logout** command
- Setup mode
- Keyboard help
- History commands
- **show** commands

Shortcuts for Entering Commands

To enhance efficiency, Cisco IOS Software has some shortcuts for entering commands. Although these are great to use in the real world, when it comes time to write a vendor exam, make sure you know the full commands, not just the shortcuts.

Router> enable = Router> enab = Router> en	Entering a shortened form of a command is sufficient as long as there is no confusion about which command you are attempting to enter.
Router# configure terminal is the same as Router# config t	

Using the `(Tab)` Key to Complete Commands

When you are entering a command, you can use the `(Tab)` key to complete the command. Enter the first few characters of a command and press the `(Tab)` key. If the

characters are unique to the command, the rest of the command is entered in for you. This is helpful if you are unsure about the spelling of a command.

Router# sh Tab = Router# show

Using the Question Mark for Help

The following output shows you how using the question mark can help you work through a command and all its parameters.

Router#?	Lists all commands available in the current command mode
Router# c? clear clock	Lists all the possible choices that start with the letter <i>c</i>
Router# cl? clear clock	Lists all the possible choices that start with the letters <i>cl</i>
Router# clock % Incomplete Command	Tells you that more parameters need to be entered
Router# clock ? Set	Shows all subcommands for this command (in this case, Set , which sets the time and date)
Router# clock set 19:50:00 14 July 2007 ? ↵	Pressing the ↵ key confirms the time and date configured.
Router#	No error message/Incomplete command message means the command was entered successfully.

enable Command

Router> enable Router#	Moves the user from user mode to privileged mode
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exit Command

Router# exit Or Router> exit	Logs a user off
Router(config- if)# exit Router(config)#	Moves you back one level
Router(config)# exit Router#	Moves you back one level

disable Command

Router# disable Router>	Moves you from privileged mode back to user mode
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logout Command

Router# logout	Performs the same function as exit
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Setup Mode

Setup mode start automatically if there is no startup configuration present.

Router# setup	Enters startup mode from the command line
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NOTE: The answer inside the square brackets, [], is the default answer. If this is the answer you want, just press **↵Enter**.

Pressing **Ctrl-C** at any time will end the setup process, shut down all interfaces, and take you to user mode (Router>).

NOTE: You *cannot* use setup mode to configure an entire router. It does only the basics. For example, you can only turn on either RIPv1 or Interior Gateway Routing Protocol (IGRP), but not Open Shortest Path First Protocol (OSPF) or Enhanced Interior Gateway Routing Protocol (EIGRP). You cannot create access control lists (ACL) here or enable Network Address Translation (NAT). You can assign an IP address to an interface, but not to a subinterface. All in all, setup mode is very limiting.

Entering setup mode is not a recommended practice. Instead, you should use the command-line interface (CLI), which is more powerful:

Would you like to enter the initial configuration dialog? [yes] : **no**

Would you like to enable autoinstall? [yes] : **no**

Autoinstall is a feature that tries to broadcast out all interfaces when attempting to find a configuration. If you answer **yes**, you must wait for a few minutes while it looks for a configuration to load. Very frustrating. Answer **no**.

Keyboard Help

The keystrokes in the following table are meant to help you edit the configuration. Because you'll want to perform certain tasks again and again, Cisco IOS Software provides certain keystroke combinations to help make the process more efficient.

A	Shows you where you made a mistake in entering a command
Router# config t ^ % Invalid input detected at '^' marker. Router# config t Router(config)#	
Ctrl - A	Moves cursor to beginning of line
Esc - B	Moves cursor back one word
Ctrl - B (or ←)	Moves cursor back one character
Ctrl - E	Moves cursor to end of line
Ctrl - F (or → ←)	Moves cursor forward one character
Esc - F	Moves cursor forward one word
Ctrl - Z	Moves you from any prompt back down to privileged mode
\$	Indicates that the line has been scrolled to the left
Router# terminal no editing Router#	Turns off the ability to use the previous keyboard shortcuts
Router# terminal editing Router#	Reenables enhanced editing mode (can use above keyboard shortcuts)

History Commands

Ctrl-P (or ↑)	Recalls commands in the history buffer in a backward sequence, beginning with the most recent command
Ctrl-N (or ↓)	Returns to more recent commands in the history buffer after recalling commands with the Ctrl-P key sequence
terminal history size _number See the next row for an example	Sets the number of commands in the buffer that can be recalled by the router (maximum 256)
Router# terminal history size 25	Causes the router to now remember the last 25 commands in the buffer
Router# no terminal history size 25	Sets the history buffer back to 10 commands, which is the default

NOTE: The **history size** command provides the same function as the **terminal history size** command.

Be careful when you set the size to something larger than the default. By telling the router to keep the last 256 commands in a buffer, you are taking memory away from other parts of the router. What would you rather have: a router that remembers what you last typed in, or a router that routes as efficiently as possible?

show Commands

Router# show version	Displays information about the current Cisco IOS Software
Router# show flash	Displays information about flash memory
Router# show history	Lists all commands in the history buffer

NOTE: The last line of output from the **show version** command tells you what the configuration register is set to.

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PART III

Configuring a Router

Chapter 6 Configuring a Single Cisco Router

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CHAPTER 6

Configuring a Single Cisco Router

This chapter provides information and commands concerning the following topics:

- Router modes
- Entering global configuration mode
- Configuring a router, specifically
 - Names
 - Passwords
 - Password encryption
 - Interface names
 - Moving between interfaces
 - Configuring a serial interface
 - Configuring a Fast Ethernet interface
 - Creating a message-of-the-day (MOTD) banner
 - Creating a login banner
 - Setting the clock time zone
 - Assigning a local host name to an IP address
 - The **no ip domain-lookup** command
 - The **logging synchronous** command
 - The **exec-timeout** command
 - Saving configurations
 - Erasing configurations
- **show** commands to verify the router configurations
- EXEC commands in configuration mode: the **do** command

Router Modes

Router>	User mode
Router#	Privileged mode (also known as EXEC-level mode)
Router(config)#	Global configuration mode
Router(config-if)#	Interface mode

Router(config-subif)#	Subinterface mode
Router(config-line)#	Line mode
Router(config-router)#	Router configuration mode

TIP: There are other modes than these. Not all commands work in all modes. Be careful. If you type in a command that you know is correct—**show running-config**, for example—and you get an error, make sure that you are in the correct mode.

Entering Global Configuration Mode

Router>	Limited viewing of configuration. You cannot make changes in this mode.
Router#	You can see the configuration and move to make changes.
Router# configure terminal Router(config)#	Moves to global configuration mode. This prompt indicates that you can start making changes.

Configuring a Router Name

This command works on both routers and switches.

Router(config)# hostname Cisco	The name can be any word you choose.
Cisco(config)#	

Configuring Passwords

These commands work on both routers and switches.

Router(config)# enable password cisco	Sets enable password
Router(config)# enable secret class	Sets enable secret password

Router(config)# line console 0	Enters console line mode
Router(config-line)# password console	Sets console line mode password to console
Router(config-line)# login	Enables password checking at login
Router(config)# line vty 0 4	Enters vty line mode for all five vty lines
Router(config-line)# password telnet	Sets vty password to telnet
Router(config-line)# login	Enables password checking at login
Router(config)# line aux 0	Enters auxiliary line mode
Router(config-line)# password backdoor	Sets auxiliary line mode password to backdoor
Router(config-line)# login	Enables password checking at login

CAUTION: The **enable secret password** is encrypted by default. The **enable password** is not. For this reason, recommended practice is that you *never* use the **enable password** command. Use only the **enable secret password** command in a router or switch configuration.

You cannot set both **enable secret password** and **enable password** to the same password. Doing so defeats the use of encryption.

Password Encryption

Router(config)# service password-encryption	Applies a weak encryption to passwords
Router(config)# enable password cisco	Sets enable password to cisco
Router(config)# line console 0	Moves to console line mode
Router(config-line)# password Cisco	Continue setting passwords as above
	...
Router(config)# no service password-encryption	Turns off password encryption

CAUTION: If you have turned on service password encryption, used it, and then turned it off, any passwords that you have encrypted will stay encrypted. New passwords will remain unencrypted.

Interface Names

One of the biggest problems that new administrators face is the interface names on the different models of routers. With all the different Cisco devices in production networks today, some administrators are becoming confused about the names of their interfaces.

The following chart is a *sample* of some of the different interface names for various routers. This is by no means a complete list. Refer to the hardware guide of the specific router that you are working on to see the different combinations, or use the following command to see which interfaces are installed on your particular router:

```
router#show ip interface brief
```

Router Model	Port Location/Slot Number	Slot/Port Type	Slot Numbering Range	Example
2501	On board	Ethernet	Interface-type number	ethernet0 (e0)
	On board	Serial	Interface-type number	serial0 (s0) & s1
2514	On board	Ethernet	Interface-type number	e0 & e1
	On board	Serial	Interface-type number	s0 & s1
1721	On board	Fast Ethernet	Interface-type number	fastethernet0 (fa0)
	Slot 0	WAC (WIN interface card) (serial)	Interface-type number	s0 & s1
1760	On Board	Fast Ethernet	Interface-type 0/port	fa0/0
	Slot 0	WIC/VIC (voice interface card)	Interface-type 0/port	s0/0 & s0/1 v0/0 & v0/1
	Slot 1	WIC/VIC	Interface-type 1/port	s1/0 & s1/1 v1/0 & v1/1

	Slot 2	VIC	Interface-type 2/port	v2/0 & v2/1
	Slot 3	VIC	Interface-type 3/port	v3/0 & v3/1
2610	On board	Ethernet	Interface-type 0/port	e0/0
	Slot 0	WIC (Serial)	Interface-type 0/port	s0/0 & s0/1
2611	On board	Ethernet	Interface-type 0/port	e0/0 & e0/1
	Slot 0	WIC (Serial)	Interface-type 0/port	s0/0 & s0/1
2620	On board	Fast Ethernet	Interface-type 0/port	fa0/0
	Slot 0	WIC (serial)	Interface-type 0/port	s0/0 & s0/1
2621	On board	Fast Ethernet	Interface-type 0/port	fa0/0 & fa0/1
	Slot 0	WIC (serial)	Interface-type 0/port	s0/0 & s0/1
1841	On board	Fast Ethernet	Interface-type 0/port	fa0/0 & fa0/1
	Slot 0	High-speed WAN interface card (HWIC)/ WIC/VWIC	Interface-type 0/slot/ port	s0/0/0 & s0/0/1
1841	Slot 1	HWIC/WIC/ VWIC	Interface-type 0/slot/ port	s0/1/0 & s0/1/1
2801	On board	Fast Ethernet	Interface-type 0/port	fa0/0 & fa0/1
	Slot 0	VIC/VWIC (voice only)	Interface-type 0/slot/ port	voice0/0/0–voice0/0/3
	Slot 1	HWIC/WIC/ VWIC	Interface-type 0/slot/ port	0/1–0/1/3 (single-wide HWIC) 0/1/0–0/1/7 (double-wide HWIC)

	Slot 2	WIC/VIC/ VWIC	Interface-type 0/slot/ port	0/2/0–0/2/3
	Slot 3	HWIC/WIC/ VWIC	Interface-type 0/slot/ port	0/3/0–0/3/3 (single-wide HWIC) 0/3/0–0/3/7 (double-wide HWIC)
2811	Built in to chassis front	USB	Interface-type port	usb0 & usb 1
	Built in to chassis rear	Fast Ethernet Gigabit Ethernet	Interface-type 0/port	fa0/0 & fa0/1 gi0/0 & gi0/1
	Slot 0	HWIC/HWIC- D/WIC/VWIC/ VIC	Interface-type 0/slot/ port	s0/0/0 & s0/0/1 fa0/0/0 & 0/0/1
	Slot 1	HWIC/HWIC- D/WIC/VWIC/ VIC	Interface-type 0/slot/ port	s0/1/0 & s0/1/1 fa0/1/0 & 0/1/1
	NME slot	NM/NME	Interface-type 1/port	gi1/0 & gi1/1 s1/0 & s1/1

Moving Between Interfaces

What happens in Column 1 is the same thing occurring in Column 3.

Router(config) #interface serial 0/0/0	Moves to serial interface configuration mode	Router(config)# interface serial 0/0/0	Moves to serial interface configuration mode
Router(config- if) #exit	Returns to global configuration mode	Router(config- if) #interface fastethernet 0/0	Moves directly to Fast Ethernet 0/0 configuration mode

Router(config) # interface fastethernet 0/0	Moves to Fast Ethernet interface configuration mode	Router(config- if)#	In Fast Ethernet 0/0 configuration mode now
Router(config- if)#	In Fast Ethernet 0/0 configuration mode now	Router(config- if)#	Prompt does not change; be <i>careful</i>

Configuring a Serial Interface

Router(config)# interface s0/0/0	Moves to serial interface 0/0/0 configuration mode
Router(config-if)# description Link to ISP	Optional descriptor of the link is locally significant
Router(config-if)# ip address 192.168.10.1 255.255.255.0	Assigns address and subnet mask to interface
Router(config-if)# clock rate 56000	Assigns a clock rate for the interface
Router(config-if)# no shutdown	Turns interface on

TIP: The **clock rate** command is used *only* on a *serial* interface that has a *DCE* cable plugged into it. There must be a clock rate set on every serial link between routers. It does not matter which router has the DCE cable plugged into it or which interface the cable is plugged into. Serial 0 on one router can be plugged into Serial 1 on another router.

Configuring a Fast Ethernet Interface

Router(config)# interface fastethernet 0/0	Moves to Fast Ethernet 0/0 interface configuration mode
Router(config-if)# description Accounting LAN	Optional descriptor of the link is locally significant
Router(config-if)# ip address 192.168.20.1 255.255.255.0	Assigns address and subnet mask to interface
Router(config-if)# no shutdown	Turns interface on

Creating a Message-of-the-Day Banner

<pre>Router(config)#banner motd # Building Power will be interrupted next Tuesday evening from 8 - 10 PM. # Router(config)#</pre>	<p># is known as a <i>delimiting character</i>. The delimiting character must surround the banner message and can be any character so long as it is not a character used within the body of the message.</p>
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TIP: The MOTD banner is displayed on all terminals and is useful for sending messages that affect all users. Use the **no banner motd** command to disable the MOTD banner. The MOTD banner displays before the login prompt and the login banner, if one has been created.

Creating a Login Banner

<pre>Router(config)#banner login # Authorized Personnel Only! Please enter your username and password. # Router(config)#</pre>	<p># is known as a <i>delimiting character</i>. The delimiting character must surround the banner message and can be any character so long as it is not a character used within the body of the message.</p>
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TIP: The login banner displays before the username and password login prompts. Use the **no banner login** command to disable the login banner. The MOTD banner displays before the login banner.

Setting the Clock Time Zone

<pre>Router(config)#clock timezone EST -5</pre>	<p>Sets the time zone for display purposes. Based on coordinated universal time. (Eastern standard time is 5 hours behind UTC.)</p>
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Assigning a Local Host Name to an IP Address

Router(config)# ip host london 172.16.1.3	Assigns a host name to the IP address. After this assignment, you can use the host name rather than an IP address when trying to Telnet or ping to that address.
Router# ping london = Router# ping 172.16.1.3	Both commands execute the same objective: sending a ping to address 172.16.1.3.

TIP: The default port number in the **ip host** command is 23, or Telnet. If you want to Telnet to a device, just enter the IP host name itself:

Router#**london** = Router#**telnet london** = Router#**telnet 172.16.1.3**

The no ip domain-lookup Command

Router(config)# no ip domain-lookup Router(config)#	Turns off trying to automatically resolve an unrecognized command to a local host name
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TIP: Ever type in a command incorrectly and are left having to wait for a minute or two as the router tries to *translate* your command to a domain server of 255.255.255.255? The router is set by default to try to resolve any word that is not a command to a Domain Name System (DNS) server at address 255.255.255.255. If you are not going to set up DNS, turn off this feature to save you time as you type, especially if you are a poor typist.

The logging synchronous Command

Router(config)# line console 0	Moves to line console configuration mode.
Router(config-line)# logging synchronous	Turns on synchronous logging. Information items sent to the console will not interrupt the command you are typing. The command will be moved to a new line.

TIP: Ever try to type in a command and an informational line appears in the middle of what you were typing? Lose your place? Do not know where you are in the command, so you just press **↵** and start all over? The **logging synchronous** command tells the router that if any informational items get displayed on the screen, your prompt and command line should be moved to a new line, so as not to confuse you.

The informational line does not get inserted into the middle of the command you are trying to type. If you were to continue typing, the command would execute properly, even though it looks wrong on the screen.

The exec-timeout Command

Router(config)# line console 0	Moves to line console configuration mode.
Router(config-line)# exec-timeout 0 0	Sets the time limit when the console automatically logs off. Set to 0 0 (minutes seconds) means the console never logs off.
Router(config-line)#	

TIP: The command **exec-timeout 0 0** is great for a lab environment because the console never logs out. This is considered to be bad security and is dangerous in the real world. The default for the **exec-timeout** command is 10 minutes and zero (0) seconds (**exec-timeout 10 0**).

Saving Configurations

Router# copy running-config startup-config	Saves the running configuration to local NVRAM
Router# copy running-config tftp	Saves the running configuration remotely to a TFTP server

Erasing Configurations

Router# erase startup-config	Deletes the startup configuration file from NVRAM
-------------------------------------	---

TIP: The running configuration is still in dynamic memory. Reload the router to clear the running configuration.

show Commands

Router# show ?	Lists all show commands available.
Router# show interfaces	Displays statistics for all interfaces.
Router# show interface serial 0/0/0	Displays statistics for a specific interface (in this case, serial 0/0/0).
Router# show ip interface brief	Displays a summary of all interfaces, including status and IP address assigned.
Router# show controllers serial 0/0/0	Displays statistics for interface hardware. Statistics display if the clock rate is set and if the cable is DCE, DTE, or not attached.
Router# show clock	Displays time set on device.
Router# show hosts	Displays local host-to-IP address cache. These are the names and addresses of hosts on the network to which you can connect.
Router# show users	Displays all users connected to device.
Router# show history	Displays the history of commands used at this edit level.
Router# show flash	Displays info about flash memory.
Router# show version	Displays info about loaded software version.
Router# show arp	Displays the Address Resolution Protocol (ARP) table.
Router# show protocols	Displays status of configured Layer 3 protocols.
Router# show startup-config	Displays the configuration saved in NVRAM.
Router# show running-config	Displays the configuration currently running in RAM.

EXEC Commands in Configuration Mode: The do Command

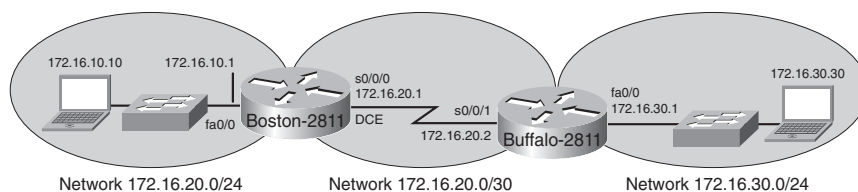
Router(config)# do show running-config	Executes the privileged-level show running-config command while in global configuration mode.
Router(config)#	The router remains in global configuration mode after the command has been executed.

TIP: The **do** command is useful when you want to execute EXEC commands, such as **show**, **clear**, or **debug**, while remaining in global configuration mode or in any configuration submode. You cannot use the **do** command to execute the **configure terminal** command because it is the **configure terminal** command that changes the mode to global configuration mode.

Configuration Example: Basic Router Configuration

Figure 6-1 illustrates the network topology for the configuration that follows, which shows a basic router configuration using the commands covered in this chapter.

Figure 6-5 Network Topology for Basic Router Configuration



Boston Router

Router> enable	Enters privileged mode.
Router# clock set 18:30:00 15 May 2007	Sets the local time on the router.
Router# configure terminal	Enters global configuration mode.
Router(config)# hostname Boston	Sets the router name to Boston.
Boston(config)# no ip domain-lookup	Turns off name resolution on unrecognized commands (spelling mistakes).

Boston(config)# banner motd # This is the Boston Router. Authorized Access Only #	Creates an MOTD banner.
Boston(config)# clock timezone EST -5	Sets time zone to eastern standard time (-5 from UTC).
Boston(config)# enable secret cisco	Enables secret password set to cisco .
Boston(config)# service password-encryption	Passwords will be given weak encryption.
Boston(config)# line console 0	Enters line console mode.
Boston(config-line)# logging synchronous	Commands will not be interrupted by unsolicited messages.
Boston(config-line)# password class	Sets the password to class .
Boston(config-line)# login	Enables password checking at login.
Boston(config-line)# line vty 0 4	Moves to virtual Telnet lines 0 through 4.
Boston(config-line)# password class	Sets the password to class .
Boston(config-line)# login	Enables password checking at login.
Boston(config-line)# line aux 0	Moves to line auxiliary mode.
Boston(config-line)# password class	Sets the password to class .
Boston(config-line)# login	Enables password checking at login.
Boston(config-line)# exit	Moves back to global configuration mode.
Boston(config)# no service password-encryption	Turns off password encryption.
Boston(config)# interface fastethernet 0/0	Moves to interface Fast Ethernet 0/0 configuration mode.

Boston(config-if)# description Engineering LAN	Sets locally significant description of the interface.
Boston(config-if)# ip address 172.16.10.1 255.255.255.0	Assigns an IP address and subnet mask to the interface.
Boston(config-if)# no shutdown	Turns on the interface.
Boston(config-if)# interface serial 0/0/0	Moves directly to interface serial 0/0/0 configuration mode.
Boston(config-if)# description Link to Buffalo Router	Sets locally significant description of the interface.
Boston(config-if)# ip address 172.16.20.1 255.255.255.252	Assigns an IP address and subnet mask to the interface.
Boston(config-if)# clock rate 56000	Sets a clock rate for serial transmission. The DCE cable must be plugged into this interface.
Boston(config-if)# no shutdown	Turns on the interface.
Boston(config-if)# exit	Moves back to global configuration mode.
Boston(config)# ip host buffalo 172.16.20.2	Sets a local host name resolution to IP address 172.16.20.2.
Boston(config)# exit	Moves back to privileged mode.
Boston# copy running-config startup-config	Saves the running configuration to NVRAM.



PART IV

Routing

Chapter 7 Static Routing

Chapter 8 RIP

Chapter 9 EIGRP

Chapter 10 Single Area OSPF

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CHAPTER 7

Static Routing

This chapter provides information and commands concerning the following topics:

- Configuring a static route on a router
- The **permanent** keyword (optional)
- Static routes and administrative distance (optional)
- Configuring a default route on a router
- Verifying static routes
- Configuration example: Static routes

Configuring a Static Route on a Router

When using the **ip route** command, you can identify where packets should be routed in two ways:

- The next-hop address
- The exit interface

Both ways are shown in the “Configuration Example: Static Routes” and the “Configuring a Default Route on a Router” sections.

Router(config)# ip route 172.16.20.0 255.255.255.0 172.16.10.2	172.16.20.0 = destination network. 255.255.255.0 = subnet mask. 172.16.10.2 = next-hop address. Read this to say, “To get to the destination network of 172.16.20.0, with a subnet mask of 255.255.255.0, send all packets to 172.16.10.2.”
Router(config)# ip route 172.16.20.0 255.255.255.0 serial 0/0/0	172.16.20.0 = destination network. 255.255.255.0 = subnet mask. Serial 0/0/0 = exit interface. Read this to say, “To get to the destination network of 172.16.20.0, with a subnet mask of 255.255.255.0, send all packets out interface serial 0/0/0.”

The permanent Keyword (Optional)

Without the **permanent** keyword in a static route statement, a static route will be removed if an interface goes down. A downed interface will cause the directly connected network and any associated static routes to be removed from the routing table. If the interface comes back up, the routes are returned.

Adding the **permanent** keyword to a static route statement will keep the static routes in the routing table even if the interface goes down and the directly connected networks are removed. You *cannot* get to these routes—the interface is down—but the routes remain in the table. The advantage to this is that when the interface comes back up, the static routes do not need to be reprocessed and placed back into the routing table, thus saving time and processing power.

When a static route is added or deleted, this route, along with all other static routes, is processed in one second. Before Cisco IOS Software Release 12.0, this processing time was five seconds.

The routing table processes static routes every minute to install or remove static routes according to the changing routing table.

To specify that the route will not be removed, even if the interface shuts down, enter the following command, for example:

```
Router(config)#ip route 172.16.20.0 255.255.255.0 172.16.10.2
permanent
```

Static Routes and Administrative Distance (Optional)

To specify that an administrative distance of 200 has been assigned to a given route, enter the following command, for example:

```
Router(config)#ip route 172.16.20.0 255.255.255.0 172.16.10.2 200
```

By default, a static route is assigned an administrative distance (AD) of 1. Administrative distance rates the “trustworthiness” of a route. AD is a number from 0 through 255, where 0 is absolutely trusted and 255 cannot be trusted at all. Therefore, an AD of 1 is an extremely reliable rating, with only an AD of 0 being better. An AD of 0 is assigned to a directly connected route. The following table lists the administrative distance for each type of route.

Route Type	Administrative Distance
Connected	0
Static	1
Enhanced Interior Gateway Routing Protocol (EIGRP) summary route	5

Exterior Border Gateway Protocol (eBGP)	20
EIGRP (internal)	90
Open Shortest Path First Protocol (OSPF)	110
Intermediate System-to-Intermediate System Protocol (IS-IS)	115
RIP	120
Exterior Gateway Protocol (EGP)	140
On-Demand Routing	160
EIGRP (external)	170
Internal Border Gateway Protocol (iBGP) (external)	200
Unknown	255

By default, a static route is always used rather than a routing protocol. By adding an AD number to your **ip route** statement, however, you can effectively create a backup route to your routing protocol. If your network is using EIGRP, and you need a backup route, add a static route with an AD greater than 90. EIGRP will be used because its AD is better (lower) than the static route. If EIGRP goes down, however, the static route will be used in its place. This is known as a *floating static route*.

If a static route refers to an exit interface rather than a next-hop address, the destination is considered to be directly connected and is therefore given an AD of 0 rather than 1.

Configuring a Default Route on a Router

Router(config)# ip route 0.0.0.0 0.0.0.0 172.16.10.2	Send all packets destined for networks not in my routing table to 172.16.10.2.
Router(config)# ip route 0.0.0.0 0.0.0.0 serial 0/0/0	Send all packets destined for networks not in my routing table out my serial 0/0 interface.

Verifying Static Routes

To display the contents of the IP routing table, enter the following command:

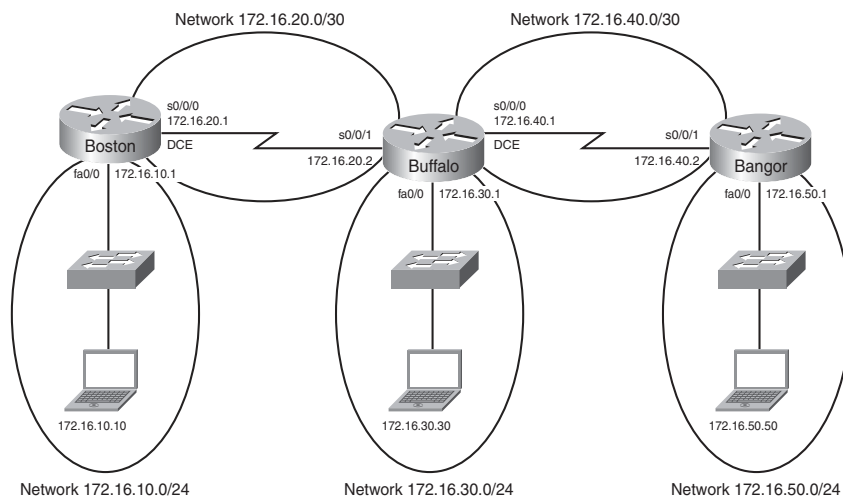
Router#**show ip route**

NOTE: The codes to the left of the routes in the table tell you from where the router learned the routes. A static route is described by the letter *S*.

Configuration Example: Static Routes

Figure 7-1 illustrates the network topology for the configuration that follows, which shows how to configure static routes using the commands covered in this chapter.

Figure 7-6 Network Topology for Static Route Configuration



NOTE: The host names, passwords, and interfaces have all been configured using the commands shown in the configuration example in Chapter 6, “Configuring a Single Cisco Router.”

Boston Router

Boston> enable	Moves to privileged mode
Boston# configure terminal	Moves to global configuration mode

Boston(config)# ip route 172.16.30.0 255.255.255.0 172.16.20.2	Configures a static route using the next-hop address
Boston(config)# ip route 172.16.40.0 255.255.255.0 172.16.20.2	Configures a static route using the next-hop address
Boston(config)# ip route 172.16.50.0 255.255.255.0 172.16.20.2	Configures a static route using the next-hop address
Boston(config)# exit	Moves to privileged mode
Boston# copy running-config startup-config	Saves the configuration to NVRAM

Buffalo Router

Buffalo> enable	Moves to privileged mode
Buffalo# configure terminal	Moves to global configuration mode
Buffalo(config)# ip route 172.16.10.0 255.255.255.0 serial 0/0/1	Configures a static route using the exit interface
Buffalo(config)# ip route 172.16.50.0 255.255.255.0 serial 0/0/0	Configures a static route using the exit interface
Buffalo(config)# exit	Moves to privileged mode
Buffalo# copy running-config startup-config	Saves the configuration to NVRAM

Bangor Router

Bangor> enable	Moves to privileged mode
Bangor# configure terminal	Moves to global configuration mode
Bangor(config)# ip route 0.0.0.0 0.0.0.0 serial 0/0/1	Configures a static route using the default route
Bangor(config)# exit	Moves to privileged mode
Bangor# copy running-config startup-config	Saves the configuration to NVRAM