CHAPTER 4

Command Summary

This chapter provides a summary of the commands a system administrator uses to configure a router for its routing and bridging tasks. Use this chapter as a quick reference for command functions and syntax. The commands are listed in alphabetical order by command type within sections. The Table of Contents groups the related commands, and the Index lists individual commands. For more complete descriptions and examples of the commands, refer to the *Router Products Configuration and Reference* publication (not included).

This chapter contains the following sections:

Command Conventions

The command descriptions use these conventions:

- Commands and keywords are in **boldface** font.
- Variables for which you supply values are in *italic* font.
- Elements in square brackets ([ ]) are optional.
- Alternative keywords are grouped in braces ({ }) and are separated by a vertical bar (|).
- Examples are printed in `screen` font.
- Information you enter is in **`boldface screen`** font.
- Nonprinting characters are shown in angle brackets (< >).
- If the **no** form of the command is not explicitly explained in the description, it negates the command.

Using the Setup Facility for Basic Configuration

The **setup** command facility enables you to start using your network server quickly and without extensive background knowledge. It does this by prompting you for the information required to perform basic configuration procedures.

Capabilities of the Setup Command Facility

Use the **setup** command facility to do the following:

- Establish host names
- Set enable (or privileged mode) passwords
- Set virtual terminal passwords
- Enable SNMP network management
- Enable routing of protocols
- Enable transparent Ethernet bridging

Configure the following protocols with the **setup** command facility:

- IP, including IGRP and RIP dynamic routing
- Novell IPX
- AppleTalk Phase 1 and Phase 2

Getting Ready for First Time Startup

The **setup** command facility operates automatically the first time you power on your network server. To use **setup** on subsequent occasions, you must invoke it as you would any other command by entering **setup** at the EXEC prompt (described later in this chapter in the section "EXEC System Use").

Before you start using the **setup** command facility, you must do the following:

Step 1 Attach an RS-232 ASCII terminal to the router console port located on the rear of the router. (See Figure 2-2 and Figure 2-3.)

For details about cabling considerations and establishing electrical connections, refer to the section "Preparing to Make Connections" in Chapter 2.

Step 2 Configure the terminal to operate at 9600 baud, 8 data bits, no parity, 1 stop bit.

Step 3 Power ON the network server and execute the **setup** command.

Note Network connections are not required in order to effectively use the **setup** command facility.

In addition, you must know the following before you start using the **setup** command facility:

- Which protocols you plan to route and the specific parameters, including host name, network numbers, addresses, and subnet masks (when applicable)
- Types of interfaces installed: Ethernet, serial, or Token Ring
- Whether or not you plan to use bridging

First-Time Router Startup

The **setup** command facility determines which interfaces are installed and prompts you for configuration information for each one. After you complete one interface, the facility automatically starts over for the next interface, continuing until each interface has been configured.

Note The first time that the **setup** command facility is used on a router, the router runs through the entire configuration process; you cannot quit out of it. If you want to make a change or to correct a mistake, press the Return key at each prompt, then restart the command. When running the **setup** command facility after the initial configuration of the router, use Ctrl-C to abort the configuration dialog at any prompt.

When you first power ON your console and network server, a script similar to the following will appear on the screen. The first section of the script displays the banner information, including the software version.

```
System Bootstrap, Version 4.6(4.3), SOFTWARE
Copyright (c) 1986-1993 by cisco Systems
IGS processor with 1024 Kbytes of memory


               Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

             Cisco Systems, Inc.
             1525 O'Brien Drive
             Menlo Park, California 94026


2000 Software (IGS-KR), Version 9.1(5)
Copyright (c) 1986-1993 by cisco Systems, Inc.
Compiled Mon 26-Apr-93 15:22 by daveu
```

The next portion of the display is a list of the installed hardware. By reading the installed hardware, the system automatically presents the appropriate interfaces during the configuration process.

```
cisco 2000 (68030) processor (revision 0xC0) with 512K/512K bytes of memory.
Processor ID 5015265
DDN X.25 software, Version 2.0.
Bridging software.
1 Token Ring/IEEE 802.5 interface.
1 Serial network interface.
32K bytes of non-volatile configuration memory.


Press RETURN to get started!
```

The first two sections of the configuration script (the banner and the installed hardware) appear each time the router is started up.

At first-time router startup, the System Configuration Dialog automatically appears, prompting you for your system's configuration information as follows:

```
          --- System Configuration Dialog ---

At any point you may enter a question mark '?' for help.
Refer to the 'Getting Started' Guide for additional help.
Use ctrl-c to abort configurations dialog at any prompt.
Default settings are in square brackets '[]'.

Continue with configuration dialog? [yes]:
```

At this point, if you choose not to continue with the system configuration dialog, you can exit by answering **no** to the prompt.

Answer **yes** to continue with the **setup** configuration dialog. The remainder of the script is the actual configuration process, with each prompt appearing automatically. Press the Return key to accept the default settings.

There is no default for the final prompt that asks you if you want to use this configuration; you must answer either yes or no. Also note that the **setup** command only asks you to configure the protocols for each interface that you specified on a global basis. For instance, if you responded no for AppleTalk under the global parameters, the command does not prompt you to configure that protocol under the interface parameters.

A sample configuration follows. The server displays the system name (sandbox), followed by an angle bracket (>), which is the prompt of the system's command interpreter.

```
Configuring global parameters:
Enter host name [Router]: sandbox
   Enter enable password: shovel
   Enter virtual terminal password: pail
   Configure SNMP Network Management? [no]: yes
Configure IP? [yes]:
      Configure IGRP routing? [yes]:
         Your IGRP autonomous system number [1]:
Configure Novell? [no]: yes
Configure AppleTalk? [no]: yes
      Multizone networks? [no]: yes
        Configure bridging? [no]: yes

Configuring interface parameters:

Configuring interface TokenRing0:
   Is this interface in use? [yes]:
   Tokenring ring speed (4 or 16) ? [16]:
   Configure IP on this interface? [no]: yes
      IP address for this interface: 131.108.92.67
      Number of bits in subnet field [0]:
      Class B network is 131.108.0.0, 0 subnet bits; mask is 255.255.0.0
   Configure Novell on this interface? [no]: yes
      Novell network number [1]:
   Configure AppleTalk on this interface? [no]: yes
      AppleTalk starting cable range [0]: 4172
      AppleTalk ending cable range [4172]:
      AppleTalk zone name [myzone]: twilight
      AppleTalk zone name: ozone
      AppleTalk zone name:
   Configure bridging on this interface? [yes]:

Configuring interface Serial0:
   Is this interface in use? [yes]:
   Configure IP on this interface? [yes]:
```

```
   Configure IP unnumbered on this interface? [yes]:
      IP address for this interface: 131.108.97.67
      Number of bits in subnet field [0]:
      Class B network is 131.108.0.0, 0 subnet bits; mask is 255.255.0.0
   Configure Novell on this interface? [yes]: no
   Configure AppleTalk on this interface? [yes]:
      Extended AppleTalk network? [no]:
      AppleTalk network number [1]:
      AppleTalk zone name [twilight]:
   Configure bridging on this interface? [yes]:

The following configuration command script was created:

hostname sandbox
enable-password shovel
line vty 0 4
password pail
snmp-server community
!
ip routing
novell routing
appletalk routing
router iso-igrp area_1
net  49.0001.0000.0C01.0D1D.00
bridge 1 protocol dec
!
!
!
interface TokenRing0
ip address 131.108.92.67 255.255.255.0
novell network 1
appletalk address 0.0
appletalk discovery
appletalk cable-range 4172-4172
appletalk zone twilight
bridge-group 1
no mop enabled
!
interface Serial0
ip address 131.194.97.67 255.255.255.0
no mop enabled
appletalk address 50000.72
appletalk zone twilight
bridge-group 1
!
router igrp 109
network 131.108.0.0
!
end

Use this configuration? [yes/no]: yes
[OK]
Use the enabled mode 'configure' command to modify this configuration.



Press RETURN to get started!
```

EXEC System Use

Execute commands by entering their names at the EXEC prompt and pressing the Return key.

There are two EXEC prompt levels. The user-level prompt is the server name followed by an angle bracket (>), as follows:

```
Router>
```

There is also a privileged-level prompt available to the system administrator after the password is entered. It is the server name followed by a pound sign (#), as follows:

```
Router#
```

Use the EXEC editing commands in Table 4-1 when entering commands at the EXEC prompt:

Table 4-1 EXEC Editing Commands

Command	Function
Delete or Backspace	Erase characters
Ctrl-U	Delete line

As a shortcut, you can abbreviate commands to the fewest letters that make them unique. For example, enter just the letters *sho* for the **show** command.

Certain EXEC commands display multiple screens with this prompt at the bottom of the screen:

```
--More--
```

To continue the output, press the space bar, or to return to the prompt, press any other key.

System Help

For system help, enter **?** or the letter **h** (for help) to display a list of which commands are available at either the user-level or the privileged-level EXEC prompt.

To get more information about certain commands, enter **?** after the command. For more information, see the lists of commands that are displayed after entering **?**.

At any time during an active Telnet session, you can list the Telnet commands by entering this command at the system prompt:

Ctrl ^ ?

Simultaneously, press the Ctrl-Shift-6 keys. Then press and release ?.

Configure Command

Use the privileged EXEC command **configure** to begin configuration of the router, as follows:

Step 1 Enter the **enable** command at the EXEC prompt:

```
Router> enable
```

The EXEC then prompts you for the privileged-level password:

```
Password:
```

Step 2 Enter the password, taking care to match uppercase and lowercase letters. For security purposes, the password does not appear. When you enter the correct password, the system displays the privileged-level prompt:

```
Router#
```

Step 3 To begin configuration mode, enter the **configure** command at the privileged-level prompt:

```
Router# configure
```

When you enter the **configure** command, the EXEC prompts you for the source of the configuration subcommands—the terminal, system memory, or the network—as follows:

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

Pressing the Return key defaults to configuring from the terminal.

The EXEC provides a simple editor for entering configuration commands and explains the editing functions as follows:

```
Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
```

Table 4-2 lists the edit key functions and their meanings:

Table 4-2 Edit Key Functions

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

Step 4 To exit the configuration mode, enter Ctrl-Z.

Step 5 To return to the user-level EXEC prompt, execute the **disable** EXEC command.

Configuration Command Types

Configuration commands are categorized by these functions:

- Global configuration commands—Define system-wide parameters.
- Interface subcommands—Define the characteristics of an interface (a serial or Ethernet interface, for example). These commands must be preceded by an **interface** command.
- Line subcommands—Define the characteristics of a serial line. These commands must be preceded by a **line** command.
- Router subcommands—Specify a routing protocol (IGRP, OSPF, and so on). These commands must be preceded by a **router** command.

Observe the following guidelines when you execute configuration commands:

- As with EXEC commands, you can enter configuration subcommands in uppercase letters, lowercase letters, or both. You also can shorten all commands and other keywords to the fewest number of characters that uniquely identify the word.
- To add a comment, begin the line with an exclamation point (!). Comments do not affect command processing.
- If the router encounters a problem, it displays an error message on the console terminal.

System Use Commands

The system use commands include EXEC terminal use commands and EXEC terminal parameter setting commands. The EXEC terminal use commands support user functions. The EXEC terminal parameter commands are used to configure the parameters of the terminal lines.

EXEC Terminal Use Commands

{**connect** | **telnet**} *connection*

Connects to a remote host using the Telnet protocol.

- **connect** or **telnet**—Use either of the two keywords.
- *connection*—Host name or IP address.

For example:

```
connect router
```

disconnect [*connection*]

Closes a connection.

- *connection*—Connection name or number displayed by the **show users** command; the default is the current connection.

For example:

```
disconnect 2
```

{**exit** | **quit** | **logout**}

Any of these commands terminates the EXEC command processor and closes any active session.

name-connection

Assigns a logical name to a connection. The EXEC prompts for the connection number and name to assign.

resume [*connection*]

Resumes a connection.

- *connection*—Connection name or number displayed by the **show users** command; the default is the current connection.

For example:

```
resume 3
```

where

Displays information about open connections associated with the current terminal line and provides the connection number.

EXEC Terminal Parameter Setting Commands

terminal ?

Lists commands you can execute to temporarily change hardware and software parameters of the current line.

terminal data-character-bits {**8** | **7**}

Sets the number of ASCII characters sent over network connections to X.25 hosts.

- **8**—Sets full 8-bit ASCII international character set (default).
- **7**—Sets 7-bit ASCII character set when connections are to hosts that routinely send parity over the network.

terminal [**no**] **escape-character** *decimal-number*

Sets or removes the escape character for the current terminal line. Default is Ctrl ^.

- *decimal-number*—The ASCII decimal representation of the desired escape character or an escape sequence.

For example:

```
terminal escape-character 17
```

terminal exec-character-bits {**7** | **8**}

Sets the number of characters read by the command parser, including those entered in configuration mode.

- **7**—Sets 7-bit ASCII character set (default).
- **8**—Sets 8-bit ASCII international character set in prompts and banners.

terminal [**no**] **length** *screen-length*

Sets the terminal screen length. A screen length of 0 or the **no** keyword disables pausing between screens of output. The screen length specified can be learned by hosts. Default is 24.

- *screen-length*—Desired number of lines.

For example:

```
terminal length 0
```

terminal [**no**] **monitor**

Copies **debug** command output and system error messages to the current terminal as well as to the console terminal.

terminal [**no**] **notify**

Establishes or removes message notification.

terminal [**no**] **padding** *decimal-number count*

Sets or cancels character padding on the current terminal line.

- *decimal-number*—ASCII decimal representation of the character.
- *count*—Number of NULL bytes sent after that character.

For example:

```
terminal padding 25 20
```

terminal special-character-bits {**7** | **8**}

Sets a mode that compares entered-in characters with special key sequences such as flow control, escape, and disconnect functions.

- **7**—Sets the 7-bit ASCII character set (default).
- **8**—Sets the full 8-bit international ASCII character set to support hosts that use these characters.

terminal [**no**] **terminal-type** *terminal-name*

Records, removes, or changes the current terminal type.

- *terminal-name*—Terminal name passed to applications that set terminal types.

For example:

```
terminal terminal-type VT100
```

terminal [**no**] **width** *columns*

Sets the number of characters (columns) on a single line of the current terminal screen. Default is 80.

- *column*—Number of columns.

For example:

```
terminal width 132
```

System Use Show Commands

Table 4-3 lists the system use **show** commands.

Table 4-3 System Use Show Commands

Command	Display
show sessions	Information about open Telnet connections.
show tcp [*line-number*]	Status of all TCP connections, or, if the *line-number* argument is specified, the status of a single TCP connection.
show terminal [**all**]	Information about the terminal configuration parameter settings for the current terminal line and the active ports of the server, or about inactive as well as active ports when the **all** keyword is included.
show users [**all**] **systat** [**all**]	Information about active lines. Include the **all** keyword to view information about inactive as well as active ports.
show version	Configuration of the system hardware, the software version, the names and sources of configuration files, and the boot images.

System Management Commands

System management commands include the EXEC system management commands.

EXEC System Management Commands

clear line *line-number*

Aborts connections and processes and resets a terminal line.

- *line-number*—Terminal line number, displayed by **show user** command.

For example:

```
clear line 3
```

debug ?

Lists and briefly describes all the **debug** command options.

Caution Enabling the debugging commands can adversely affect system operation. Use these commands only under the direction of qualified technical support personnel.

ping

Invokes a diagnostic tool for testing connectivity. Results are helpful for evaluating path-to-host connectivity, delays over the path, and whether the host is functioning.

show ?

Lists **show** command options for the user-level prompt or privileged-level prompt, whichever is active.

test interfaces

Intended for use by qualified technical support personnel only; not for diagnosing problems with an operational router.

test memory

Intended for use by qualified technical support personnel only; not for diagnosing problems with an operational router.

trace [*destination*]

Allows the network administrator to discover the routes that packets will actually take when traveling to their destinations. Supports IP route tracing. To terminate the **trace** command operation, enter the escape sequence.

undebug *option*

Disables diagnostic output enabled by the **debug** command option.

For example:

```
debug packet
undebug packet
```

write erase

Erases the configuration information in nonvolatile memory. This command does not affect the configuration in use.

write memory

Copies the current configuration information in RAM to a file in nonvolatile memory.

write network

Sends a copy of the current configuration information to a server host. The system prompts for a destination host and a filename. The **write network** command allows a user to edit the configuration file on a separate workstation using a full-screen editor.

write terminal

Displays the current configuration information.

System Management Show Commands

Table 4-4 lists the system management **show** commands.

Table 4-4 System Management Show Commands

Command	Display
show buffers [*interface*]	Statistics for the buffer pools on the network server. The *interface* argument specifies a search of only those buffers that have been associated with the interface for longer than one minute.
show configuration	Contents of nonvolatile memory.
show debugging	Current settings of the **debug** command options.
show line	Line status.
show logging	State of syslog error and event logging, including host addresses and whether console logging is enabled. Also displays SNMP configuration parameters and protocol activity.
show memory	Memory-free-pool statistics, including summary information about the activities of the system memory allocator and a block-by-block listing of memory use.
show processes	Information about all active processes.
show processes memory	Information about memory utilization.
show protocol	Global and interface-specific status of any configured Level 3 protocol.
show stacks	Monitors the stack utilization of processes and interrupt routines and displays the reason for the last system reboot. Useful for analyzing system crashes.

System Configuration Commands

System configuration commands include system global configuration commands and line configuration subcommands. Use the global configuration commands to define global router configuration parameters, and use line configuration subcommands to configure individual lines.

System Global Configuration Commands

[**no**] **banner** {**motd** | **exec** | **incoming**} *c text c*

Shows or removes the message that the EXEC command interpreter displays whenever a user starts any EXEC process or activates a line.

- **motd**, **exec**, or **incoming**—Specifies when the banner message is displayed.
- *c*—Delimiting character that you use to signify the beginning and end of the banner message.
- *text*—Message to be displayed on the screen whenever an interface line is activated.

For example:

```
banner motd #
Building power will be off from 7:00 AM to 9:00 AM this Tuesday.#
```

[**no**] **boot buffersize** *bytes*

Specifies the size of the buffer to be used for netbooting a host or a network configuration file. The **no** form restores the default, which is the size of nonvolatile memory, or 32 kilobytes if you do not have nonvolatile memory.

- *bytes*—Size of the buffer.

For example:

```
boot buffersize 64
```

[**no**] **boot** {**host** | **network** | **system**} *filename* [*address*]

Configures the system image boot files. The **no** form with the appropriate keyword and filename removes the name. The command can be executed multiple times to build ordered lists.

- **host**—Changes host configuration filename.
- **network**—Changes network configuration filename.
- **system**—Indicates that the filename and host address for the system image are in nonvolatile memory.
- *filename*—New name for the host configuration file or filename of operating system to load.
- *address*—Network host or a subnet broadcast address. Default is 255.255.255.255.

For example:

```
boot host config1
boot network config2
boot system opsoft
```

[**no**] **boot system rom**

Configures the system to auto-boot from the ROM system image. This command is usually used as a backup to other **boot system** commands that specify system images existing on the network.

[**no**] **buffers** {**small** | **middle** | **big** | **large** | **huge**} {**permanent** | **max-free** | **min-free** | **initial**} *number*

Allows a network administrator to adjust initial buffer pool settings and set limits at which temporary buffers are created and destroyed. The **no** form with appropriate keywords and arguments restores the default buffer values. Use this command only if instructed to by qualified technical support personnel.

- **small** | **middle** | **big** | **large** | **huge**—Size of buffers in the pool. The default number is determined by the hardware configuration.
- **permanent** | **max-free** | **min-free** | **initial**—Buffer management parameter to be changed.
- *number*—Number of buffers to be allocated.

For example:

```
buffers small min-free 50
```

[**no**] **buffers huge size** *number*

Dynamically resizes all huge buffers to the value that you supply. The buffer size cannot be lowered below the default. The **no** version with the argument restores the default buffer values. Use this command only when instructed to by qualified technical support personnel.

- *number*—Size of huge buffers.

For example:

```
buffers huge size 20000
```

config-register *value*

Upon system restart, changes software configuration register settings.

- *value*—Register number to be set in hexadecimal. Common values: 0x1 sets the default switch register contents; 0x2 boots from the ROM monitor.

Use with the **boot system** command to enable the system to boot from the ROM monitor.

default-value data-character-bits {**8** | **7**}

Sets the number of ASCII characters sent over network connections to X.25 hosts.

- **8**—Sets full 8-bit ASCII international character set (default).
- **7**—Sets 7-bit ASCII character set when connections are to hosts that routinely send parity over the network.

default-value exec-character-bits {**7** | **8**}

Sets the number of characters read by the command parser, including those entered in configuration mode.

- **7**—Sets 7-bit ASCII character set (default).
- **8**—Sets 8-bit ASCII international character set in prompts and banners.

default-value special-character-bits {**7** | **8**}

Sets a mode that compares entered-in characters with special key sequences such as flow control, escape, and disconnect functions.

- **7**—Sets the 7-bit ASCII character set (default).
- **8**—Sets the full 8-bit international ASCII character set to support hosts that use these characters.

[**no**] **dialer-list** *dialer-group* **list** *list-number*
[**no**] **dialer-list** *dialer-group* **protocol** *protocol-name* {**permit** | **deny**}

Controls automatic dialing of DDR using standard IP or bridging access lists. Applies to dial-on-demand only.

- *dialer-group*—Number of a dialer group identified in any **dialer group** interface subcommand.
- **list** *list-number*—Access list number specified in any IP or bridging access list.
- **protocol** *protocol-name*—One of the following supported protocols: **ip**, **novell**, **appletalk**, or **bridge** (bridging).
- **permit** or **deny**—Specifies whether automatic dialing is permitted or denied.

For example:

```
dialer-list 1 list 101
dialer-list 2 protocol appletalk deny
```

[**no**] **enable last-resort** {**succeed** | **password**}

Allows you to specify what happens if the TACACS servers used by the **enable** command do not respond. The default action is to fail to enable.

- **succeed** or **password**—Use **succeed** to enable without further question. Use **password** to enable only if the user executes the privileged command level.

enable password *password*

Assigns a password for the privileged command level.

- *password*—Password you enter in response to the EXEC command **enable**.

For example:

```
enable password yourpassword
```

[**no**] **enable use-tacacs**

Enables or disables use of TACACS to check the user ID and password supplied to the EXEC **enable** command.

hostname *name*

Specifies the name for the network server. Default is Router.

- *name*—Name of the network server.

For example:

```
hostname HAL
```

interface dialer *number*

Designates a dialer group number, indicated by the *number* argument.

For example:

```
interface dialer 1
encapsulation ppp
dialer map ip 131.108.2.5 username zebra 14155553434
```

interface *type unit*

Specifies an interface and begins interface configuration.

- *type*—Interface type*:* **serial**, **ethernet**, or **tokenring**.
- *unit*—Interface number or card number.

For example:

```
interface serial 0
interface eth 0
```

line [*type-keyword*] *first-line* [*last-line*]

Identifies a specific line for configuration and starts line configuration.

- *type-keyword*—Type of line to be configured: **console**, **aux**, or **vty**.

- *first-line*—If *type-keyword* is specified, provide the relative number (first line) in a contiguous group you want to configure. If *type-keyword* is not specified, provide the absolute number. Use the EXEC command **show users** to display line numbers.
- *last-line*—If *type-keyword* is specified, provide the relative number (last line) in a contiguous group you want to configure. If *type-keyword* is not specified, provide the absolute number.

For example:

```
line vty 0 4
```

[**no**] **logging buffered**

Copies logging messages to an internal buffer instead of writing them to the console.

[**no**] **logging console** *level*

Limits the logging of messages displayed on the console terminal to messages at or above the specified level. Default is debugging.

- *Level*–The argument *level* is one of the following keywords:

  emergencies—System unusable

  alerts—Immediate action needed

  critical—Critical conditions

  errors—Error conditions

  warnings—Warning conditions

  notifications—Normal but significant conditions

  informational—Informational messages only

  debugging—Debugging messages

For example:

```
logging console emergencies
```

[**no**] **logging** *IP-address*

Identifies a syslog server host to receive logging messages.

- *IP-address*—Internet address of the host.

For example:

```
logging 131.108.2.125
```

[**no**] **logging monitor** *level*

Limits the logging messages displayed on terminal lines other than the console line to messages with a level at or above *level.*

- *level*—One of the keywords listed for the **logging console**.

For example:

```
logging monitor notifications
```

[**no**] **logging on**

Enables or disables message logging to all supported destinations except the console. Default is enabled.

[**no**] **logging trap** *level*

Limits the logging messages sent to syslog servers to messages with a level at or above *level*.

- *level*—One of the keywords listed for the **logging console**.

For example:

```
logging trap errors
```

[**no**] **priority-list** *list* **default** *queue-keyword*

Assigns a priority queue for those datagrams that did not match any other rule in the priority list. If no default or the **no** form is specified, the **normal** queue is assumed.

- *list*—Integer from 1 through 10 that identifies the priority list selected by the user.
- *queue-keyword*—Priority queue name: **high**, **medium**, **normal**, or **low**.

For example:

```
priority list 2 default medium
```

[**no**] **priority-list** *list* **interface** *interface-name queue-keyword*

Sets up priority queuing on the specified interface. The **no** form removes the item from the list.

- *list*—Integer from 1 through 10 that identifies the priority list selected by the user.
- *interface-name*—Name of the interface.
- *queue-keyword*—Priority queue name: **high**, **medium**, **normal**, or **low**.

For example:

```
priority list 1 interface ethernet 2 medium
```

[**no**] **priority-list** *list* **protocol** *protocol-name queue-keyword [args]*

Sets up priority queuing by protocol type. The **no** form removes the item from the list.

- *protocol-name*—Name of the protocol: **ip**, **appletalk**, **novell**, **bridge**, or **rsrb**.
- *list*—Integer from 1 through 10 that identifies the priority list selected by the user.
- *queue-keyword*—Priority queue name: **high**, **medium**, **normal**, or **low**.
- *args*—The optional keyword *args* is one of the following:

  gt *byte-count*—Specifies a greater-than count. The priority level assigned goes into effect when a packet exceeds the value entered for the argument *byte-count*.

  lt *byte-count*—Specifies a less-than count. The priority level assigned goes into effect when a packet size is less than the value entered for *byte-count*.

  bridge list *list-number*—Assigns the priority level to bridged traffic according to the *list-number*, which is the Ethernet-type code access list number assigned using the **access-list** command.

list *list-number*—Assigns traffic priorities according to the *list-number*, which is the IP access list number assigned by the **access-group list** interface subcommand.

tcp *port*—Assigns the priority level defined to TCP packets originating from or destined to a specified port.

udp *port*—Assigns the priority level defined to UDP packets originating from or destined to the specified port.

For example:

```
priority-list 1 protocol appletalk high
priority-list 4 protocol appletalk medium lt 200
priority-list 4 protocol ip medium tcp 23
```

[**no**] **priority-list** *list* **queue-limit** *high-limit medium-limit normal-limit low-limit*

Specifies the maximum number of packets that can wait in a single priority queue. If a priority queue overflows, the router discards excess datagrams and may send quench messages. The **no** form resets all four queue sizes to their defaults: *high-limit* = 20; *medium-limit* = 40; *normal-limit* = 60; *low-limit* = 80.

- *list*—Integer from 1 through 10 that identifies the priority list selected by the user.

For example:

```
priority-list 1 queue-limit 20 20 20 10
```

[**no**] **priority-list** *list queue-keyword address group-number address-number*

Sets up priority queuing based on the address of the serial link. The **no** form removes the item from the list.

- *list*—Integer from 1 through 10 that identifies the priority list selected by the user.
- *queue-keyword*—Priority queue name: **high**, **medium**, **normal**, or **low**.
- *address-number*—Address of the serial link.

[**no**] **scheduler-interval** *milliseconds*

Sets the maximum amount of time that can elapse without the router running the lowest-priority system processes. The minimum interval that can be specified is 500 milliseconds; there is no maximum value. The **no** form restores the no maximum default.

- *milliseconds*—Number of milliseconds. Must be 500 or greater.

For example:

```
scheduler-interval 750
```

[**no**] **service** *keyword*

Tailors use of network-based services by the network server.

- *keyword*—The argument *keyword* is one of the following:

  config—Specifies TFTP autoloading of configuration files; disabled by default on systems with nonvolatile memory.

decimal-tty—Specifies that line numbers be displayed and interpreted as decimal numbers rather than octal numbers; disabled by default.

finger—Allows Finger protocol requests (defined in RFC 742) to be made of the network server; enabled by default.

password-encryption—Enables encrypted passwords.

tcp-keepalives-{**in** | **out**}—Generates keepalive packets on idle network connections. The **in** keyword generates them on incoming connections; the **out** keyword generates them on outgoing connections.

timestamps—Precedes system error message output with system uptime.

[**no**] **snmp-server**

Enables the SNMP operations. The no version disables the SNMP operations.

[**no**] **snmp-server access-list** *list*

Sets up an access list that determines which hosts can send requests to the network server. Applies only to the global read-only SNMP agent configured by the **snmp-server community** command.

- *list*—IP list, expressed as an integer from 1 through 99.

For example:

```
snmp-server access-list 20
```

snmp-server community [*string* [**RO** | **RW**] [*list*]]
no snmp-server [**community** [*string*]]

Enables or disables SNMP server operation on the network server.

- *string*—Community string that acts like a password and permits access to the SNMP protocol.
- **RO** or **RW**—The **RO** keyword specifies read-only access (default); the **RW** keyword specifies read-write access.
- *list*—Integer from 1 through 99 that specifies an access list of Internet addresses that can use the community string.

For example:

```
snmp-server community yourstring RO 4
```

[**no**] **snmp-server host** *IP-address community-string* [**snmp** | **tty**]

Specifies which host or hosts should receive TRAP messages.

- *IP-address*—Name or Internet address of the host.
- *community-string*—Your community string, similar to a password, that you set with the **snmp-server community** command.
- **snmp** or **tty**—The keywords **snmp** or **tty** specify the TRAP type, as follows:

  snmp—Sends all SNMP-type TRAP messages and starts the router-specific RELOAD TRAP message.

  tty—Includes TCP connection TRAP messages.

For example:

```
snmp-server host 131.108.2.160 yourstring
```

[**no**] **snmp-server packetsize** *bytes*

Sets or removes control over the largest SNMP packet size permitted when the SNMP server is receiving a request or generating a reply.

- *bytes*—Byte count from 484 through 8192. Default is 484.

For example:

```
snmp-server packetsize 8192
```

[**no**] **snmp-server queue-length** *length*

Defines the length of the message queue for each TRAP host. Default is 10.

- *length*—Number of TRAP events that can be held before the queue must be emptied.

For example:

```
snmp-server queue-length 4
```

[**no**] **snmp-server system-shutdown**

Allows or restricts use of the SNMP message reload feature. Prevents an SNMP system-shutdown request from resetting the router agent.

[**no**] **snmp-server trap-authentication**

Allows the network server to send a TRAP message when it receives a packet with an incorrect community string. The **no** form restricts the sending of TRAP messages.

[**no**] **snmp-server trap-timeout** *seconds*

Defines how often the router attempts to resend TRAP messages in the retransmission queue. The **no** form restores the default of 30 seconds.

- *seconds*—Number of seconds in the interval.

For example:

```
snmp-server trap-timeout 20
```

[**no**] **tacacs-server attempts** *count*

Controls the number of login attempts that can be made on a line set up for TACACS verification. The **no** form allows no attempts. Default is 3.

- *count*—Number of attempts.

For example:

```
tacacs-server attempts 6
```

[**no**] **tacacs-server authenticate** {**connect** | **enable**}

Specifies that a response is required from the network or communication server before a user can perform a specific action. The **no** form removes the response requirement. Select the action that requires a response:

- **connect**—Make TCP connections.
- **enable**—Execute the **enable** command.

[**no**] **tacacs-server extended**

Enables or disables an extended TACACS mode.

[**no**] **tacacs-server host** *name*

Specifies a TACACS host.

- *name*—Name or Internet address of the host.

For example:

```
tacacs-server host host1
```

[**no**] **tacacs-server last-resort** {**password** | **succeed**}

Causes the network server to request the privileged password as verification or permits successful login without further input from the user. The **no** form removes the specification. Select one keyword to configure the desired action.

- **password**—Allows the user to access the privileged-level command mode by entering the password set by the **enable** command.
- **succeed**—Allows the user to access the privileged-level command mode without further question.

tacacs-server notify {**connect** | **enable** | **logout**}

Causes a message to be transmitted to the TACACS server; the message is retransmitted in the background for up to 5 minutes. The **no** form removes the specification.

Select one keyword to specify when the TACACS server is notified:

- **connect**—Make TCP connections.
- **enable**–Execute the **enable** command.
- **logout**—Log out.

tacacs-server optional-passwords

Specifies that the first TACACS request to a TACACS server is made *without* password verification.

[**no**] **tacacs-server retransmit** *retries*

Specifies the number of times the server will search the list of TACACS server hosts before abandoning the attempt. The **no** form restores the default of 2.

- *retries*—Retransmit count.

For example:

```
tacacs-server retransmit 4
```

[**no**] **tacacs-server timeout** *seconds*

Sets the interval the server waits for a server host to reply. The **no** form restores the default of 5 seconds.

- *seconds*—Number of seconds.

For example:

```
tacacs-server timeout 10
```

[**no**] **tftp-server system** *filename ip-access-list*

Specifies or removes TFTP server operation for a communication server.

- *filename*—Name of the network server ROM file.
- *access-list*—IP access list number.

For example:

```
tftp-server system configfile 22
```

username *name* [**nopassword** | **password** *encryptiontype password*]
username *name* **password** *secret*
username *name* [**accesslist** *number*]
username *name* [**autocommand** *command*]
username *name* [**noescape**] [**nohangup**]

Implements a username-based authentication system for networks that cannot support a TACACS service. Also defines usernames that get special treatment.

- *name*—Name of either a local communication server or a remote device.
- **nopassword**—No password is required for this user to log in.
- **password**—Specifies a possibly encrypted password for this username.
- *encryptiontype*—Single-digit number. Currently defined encryption types are 0, which means no encryption, and 7, which specifies a predefined encryption algorithm.
- *password*—The password you enter for authentication.
- *secret*—Specifies the secret (a special password) for the local communication server or remote device.
- **accesslist** *number*—Specifies an outgoing access list that overrides the access list specified in the **access class** line configuration subcommand.
- **autocommand** *command*—Causes the command specified to be issued automatically after the user logs in.
- **noescape**—Prevents the user from having an escape character with which to escape from the host system.

- **nohangup**—Prevents the network server from disconnecting the user after an automatic command.

For example:

```
username who nopassword nohangup autocommand show users
username superuser password yourpassword
```

Line Configuration Subcommands

data-character-bits {**8** | **7**}

Sets the number of ASCII characters sent over network connections to X.25 hosts.

- **8**—Sets full 8-bit ASCII international character set (default).
- **7**—Sets 7-bit ASCII character set when connections are to hosts that routinely send parity over the network.

[**no**] **escape-character** *decimal-number*

Sets or removes the escape character on the specified line. Default escape character: Ctrl ^ X.

- *decimal-number*—ASCII decimal representation of the character or a control sequence.

For example:

```
escape-character 13
```

[**no**] **exec-banner**

Enables or disables a banner. Default is enabled.

exec-character-bits {**7** | **8**}

Sets the number of characters read by the command parser, including those entered in configuration mode.

- **7**—Sets 7-bit ASCII character set (default).
- **8**—Sets 8-bit ASCII international character set in prompts and banners.

[**no**] **exec-timeout** *minutes* [*seconds*]

Sets the interval the EXEC waits for user input before resuming the current connection, or if no connections exist, before returning the terminal to the idle state and disconnecting the incoming session. The **no** form is the same as specifying a timeout of 0.

- *minutes*—Number of minutes. The default interval is 10 minutes.
- *seconds*—Number of seconds; an interval of 0 specifies no timeouts.

For example:

```
exec-timeout 15 30
```

[**no**] **length** *screen-length*

Sets the terminal screen length. A screen length of 0 disables pausing between screens of output. Default is 24.

- *screen-length*—Number of lines on the screen.

For example:

```
length 32
```

[**no**] **location** *text*

Enters or removes textual description concerning the terminal location and status.

- *text*—Desired description.

For example:

```
location In the hall
```

[**no**] **login**

Enables or disables checking for the password specified by the **password** command.

[**no**] **login tacacs**

Invokes use of the TACACS user ID and password-checking mechanism instead of regular password checking. The **no** form disables this mechanism.

[**no**] **notify**

Enables or disables line notification when a user running multiple, concurrent Telnet connections has output pending on a connection other than the current line.

[**no**] **padding** *decimal-number count*

Sets or cancels character padding for a specified output character.

- *decimal-number*—ASCII decimal representation of the character.
- *count*—Number of NULL bytes sent after the character.

For example:

```
padding 13 25
```

[**no**] **password** *password*

Specifies a password.

- *password*—The password you enter for line access. It can contain up to 80 alphanumeric characters, including spaces.

For example:

```
password yourpassword
```

special-character-bits {**7** | **8**}

Sets a mode that compares entered-in characters with special key sequences such as flow control, escape, and disconnect functions.

- **7**—Sets the 7-bit ASCII character set (default).
- **8**—Sets the full 8-bit international ASCII character set to support hosts that use these characters.

[**no**] **vacant-message** [*c message c*]

Controls whether or not a banner is displayed on the screen of an idle terminal. The command without any arguments causes the default message to be displayed. The **no vacant-message** command suppresses a banner message.

- *c*—Delimiting character that you will use to signify the beginning and end of the banner message.
- *message*—Message to be shown on the screen whenever an interface line is activated.

For example:

```
vacant-message #
    Welcome to Cisco Systems, Inc.
#
```

Interface and Media Configuration

The interface and media features include interface configuration subcommands, EXEC interface management commands, frame relay interface subcommands, the X.25 EXEC command, and LAPB and X.25 interface subcommands.

Interface Configuration Subcommands

[**no**] **bandwidth** *kilobits*

Sets a bandwidth value for an interface. This is a routing parameter only; it does not affect the physical interface. The **no** form restores the default, which is set during startup.

- *kilobits*—Bandwidth in kilobits per second.

[**no**] **delay** *tens-of-microseconds*

Sets the delay that higher-level protocols can use to make operating decisions. The **no** form restores the default, which is no delay.

- *tens-of-microseconds*—Delay for an interface or network segment expressed in tens of microseconds.

For example:

```
delay 20
```

[**no**] **description** *name-string*

Adds a descriptive name to an interface.

- *name-string*—Comment displayed in the configuration file.

For example:

```
description 3174 Controller for test lab
```

[**no**] **dialer enable-timeout** *number-of-seconds*

Sets the length of time an interface stays down before it is available for dialing. The **no** form restores the default of 15 seconds.

- *number-of-seconds*—Number of seconds an interface stays down before it is available to dial again.

For example:

```
dialer enable-timeout 10
```

[**no**] **dialer fast-idle** *number-of-seconds*

Specifies the idle time before the line is disconnected on interfaces for which there is an unusually high level of contention. The **no** form restores the default of 20 seconds.

- *number-of-seconds*—Number of seconds.

For example:

```
dialer fast-idle 30
```

[**no**] **dialer-group** *group-number*

Assigns an interface to a set of access list expressions. These access list expressions define which packets cause a connection to be established and which keep an interface from being idle. Applies to dial-on-demand connections only. The **no** form removes an interface from the specified dialer-group.

- *group-number*—Number of the dialer group to which the specific interface belongs. This group number corresponds to a dialer group defined using the **dialer-list** command.

For example:

```
dialer-group 3
```

[**no**] **dialer idle-timeout** *number-of-seconds*

Specifies the idle time before the line is disconnected. Applies to dial-on-demand connections only. The **no** form restores the default of 120 seconds.

- *number-of-seconds*—Number of seconds of idle time that must occur on an interface before the line is disconnected.

For example:

```
dialer idle-timeout 180
```

[**no**] **dialer in-band**

Sets or removes V.25bis dialing for the specified serial interface.

[**no**] **dialer map** *protocol next-hop-address* [**username** *name*] *dial-string*

Defines multiple dial-on-demand numbers for a particular interface. Applies to dial-on-demand connections only. The **no** form deletes a particular dialer map entry.

- *protocol*—Supported protocol; currently must be **ip**.
- *next-hop-address*—IP address used to compare against addresses to which packets are destined.
- **username** *name*—Specifies a remote system with which the local router communicates.
- *dial-string*—Telephone number sent to the DCE dialing device when packets with the specified *next-hop-address* are seen.

For example:

```
dialer map ip 131.108.2.5 14155553434
dialer map ip 131.108.2.5 username ZZZ 14155553434
```

dialer rotary-group *number*

Places associated interface in the dialer rotary group indicated by the *number* argument.

For example:

```
interface dialer 1
interface serial 0
dialer rotary-group 1
```

[**no**] **dialer string** *dial-string*

Specifies or deletes a telephone number to be passed to a DCE device, typically a V.25bis modem.

- *dial-string*—Character string to be passed to the V.25bis DCE device.

For example:

```
dialer string 14155553434
```

[**no**] **dialer wait-for-carrier-time** *number-of-seconds*

Specifies how long the router will wait for a carrier. The **no** form restores the default of 30 seconds.

[**no**] **early-token-release**

Enables or disables the ability of Token Ring interfaces to release the token to the ring immediately after transmitting. Default is disabled.

encapsulation *encapsulation-type*

Assigns an encapsulation method.

- *encapsulation-type*—The argument *encapsulation-type* identifies a supported encapsulation type:

  arpa—Ethernet version 2.0 encapsulation

  bfex25—Blacker Front End Encryption X.25 operation

  ddnx25—DDN X.25 DTE operation

  ddnx25-dce—DDN X.25 DCE operation

  frame-relay [**ietf**]—Frame Relay and optional IETF encapsulation

  hdh—HDH protocol

  hdlc—HDLC protocol

  iso1—IEEE 802.3 encapsulation

  lapb—X.25 LAPB DTE operation

  lapb-dce—X.25 LAPB DCE operation

  multi-lapb—X.25 LAPB multiprotocol DTE operation

  multi-lapb-dce—X.25 LAPB multiprotocol DCE operation

  ppp—Point-to-Point Protocol (PPP)

  snap—IEEE 802.2 Ethernet media

  x25—X.25 DTE operation

[**no**] **hold-queue** *length* {**in** | **out**}

Specifies the hold-queue limit of an interface. The **no** form restores the default values for the interface.

- *length*—Maximum number of packets in the queue.

- **in** or **out**—Use **in** to specify the input queue; use **out** to specify the output queue.

[**no**] **keepalive** [*seconds*]

Adjusts the keepalive timer for a specific interface. Default is 10 seconds.

- *seconds*—Number of seconds after which the keepalive timer is activated.

For example:

```
keepalive 3
```

[**no**] **mtu** *bytes*

Adjusts the default maximum transmission unit (MTU) size. The **no** form restores the default for the interface.

- *bytes*—Desired size in bytes. Must be at least 64 bytes for serial interfaces.

For example:

```
mtu 576
```

[**no**] **ppp authentication chap**

Enables or disables Challenge Handshake Authentication Protocol (CHAP) on the associated interface.

priority-group *list*

Assigns a priority group to an interface.

- *list*—Priority list number assigned to the interface.

For example:

```
priority-group 1
```

[**no**] **pulse-time** *seconds*

Enables or disables pulsing DTR signals on the MCI and SCI serial interfaces for a minimum interval.

- *seconds*—Number of seconds in the minimum interval.

For example:

```
pulse-time 3
```

ring-speed *speed*

Sets operational ring speed for Token Ring interface. Default is 16.

- *speed*—Operation speed: **4** or **16** Mbps.

For example:

```
ring-speed 4
```

[**no**] **shutdown** *interface*

Disables or enables an interface.

- *interface*—Interface name.

EXEC Interface Management Commands

clear counters [*type unit*]

Clears all the current interface counters from the interface or clears those counters described by the optional arguments.

- *type*—Interface type: **serial**, **ethernet**, or **tokenring**.
- *unit*—Interface unit

For example:

```
clear counters serial 1
```

clear interface [*type unit*]

Resets the hardware logic on an interface.

- *type*—Interface type: **serial**, **ethernet**, or **tokenring**.
- *unit*—Interface connection

For example:

```
clear interface serial 0
clear interface tokenring 0
```

Interface Management Show Commands

Table 4-5 lists the interface management **show** commands.

Table 4-5 Interface Management Show Commands

Command		Display
show controllers	**serial** **tokenring**	Current internal status information for different interface types.
show dialer interface [*interface unit*]		Information about dialer interfaces or a specific interface when optional *interface* type is specified.
show interfaces	**ethernet** [*unit*] **serial** [*unit*] **tokenring** [*unit*]	Network interface statistics. Argument *unit* is the interface unit or card number.
show interfaces [*interface unit*] [**accounting**]		Number of packets of each protocol type that have been transmitted through the interface.

Frame Relay Interface Subcommands

[**no**] **frame-relay keepalive** *seconds*

Enables and disables the LMI mechanism for serial lines using the Frame Relay encapsulation. Default is 10 seconds.

- *seconds*—Keepalive interval in seconds.

For example:

```
frame-relay keepalive 15
```

[**no**] **frame-relay lmi-type ANSI**

Specifies the exchange of local management interface messages as defined by ANSI standard T1.617. The **no** form restores the LMI type to the default as defined by the specification.

frame-relay local-dlci *number*

Used for testing. Sets the source data link connection identifier (DLCI) for use when the local management interface (LMI) is not supported. If LMI is supported, and the multicast information element is present, the network server sets its local DLCI based on information provided via the LMI.

- *number*—Local or source DLCI number.

For example:

```
frame-relay local-dlci 100
```

frame-relay map *protocol protocol-address DLCI* [**broadcast**] [**ietf**]
frame-relay map bridge *DLCI* **broadcast**
no frame-relay map

Defines the mapping between an address and the DLCI used to connect to the address.The Frame Relay map tells the network server how to get from a specific protocol and address pair to the correct DLCI. The **no** form deletes the mapping entry.

- *protocol*—One of these keywords: **ip**, **appletalk**, or **novell**.
- *protocol-address*—Protocol address.
- *DLCI*—DLCI number.
- **broadcast**—Specifies that broadcasts should be forwarded to this address when the multicast is not enabled.
- **ietf**—Selects RFC 1294 Frame Relay encapsulation.
- **bridge**—Specifies bridging.

For example:

```
frame-relay map IP 131.108.123.1 100
frame-relay map bridge 144 broadcast
```

frame-relay multicast-dlci *number*

Defines a DLCI to be used for multicasts. Use this command only when the multicast facility is *not* supported. Network transmissions (packets) sent to a multicast DLCI are delivered to all network servers defined as members of the multicast group.

- *number*—Multicast group number.

For example:

```
frame-relay multicast-dlci 1022
```

[**no**] **frame-relay short-status**

Instructs the network server to request the short status message from the switch. (See Version 2.3 of the joint *Frame Relay Interface* specification.) Default is disabled (full status message).

Frame Relay Show Commands

Table 4-6 lists the Frame Relay **show** commands.

Table 4-6 Frame Relay Show Commands

Command	Display
show frame-relay map	Information about the current Frame Relay map.
show frame-relay traffic	Frame Relay statistics.

X.25 EXEC Command

bfe {**enter** | **leave**} *interface unit*

Implements Blacker Front End Emergency (BFE) mode when the **x25 bfe-decision ask** configuration command is set.

- **enter**—Router enters emergency mode.
- **leave**—Router leaves emergency mode.
- *interface*—Interface name such as serial, Ethernet, and so on.
- *unit*—Interface number, port number, card number, and so on.

For example:

```
bfe leave serial 1
```

LAPB and X.25 Interface Subcommands

hdh {**packet** | **message**}

Enables the packet or message mode of the HDH protocol.

- **packet**—Specifies the packet mode.
- **message**—Specifies the message mode.

lapb k *window-size*

Defines the maximum permissible number of outstanding LAPB frames.

- *window-size*—Packet count, from 1 through 7.

For example:

```
lapb k 4
```

lapb n1 *bits*

Defines the maximum number of bits a LAPB frame can hold. Default is 12000 bits (1500 bytes).

- *bits*—Number of bits. Must be a multiple of 8 from 8 through 12000.

For example:

```
lapb n1 6000
```

lapb n2 *retries*

Defines the maximum number of times a LAPB acknowledgment frame can be retransmitted. Default is 20.

- *retries*—Retransmission count, from 1 through 255.

For example:

```
lapb n2 100
```

lapb t1 *milliseconds*

Defines the length of time a LAPB transmitted frame can remain unacknowledged before the router polls for an acknowledgment. Default is 3000.

- *milliseconds*—Number of milliseconds, from 1 through 64000.

For example:

```
lapb t1 32000
```

[**no**] **x25 accept-reverse**

Instructs the router to accept all reverse charge calls by default. This behavior also can be configured on a peer-to-peer basis using the **x25 map** subcommand. The **no** form disables this feature.

x25 address *X.121-address*

Sets the X.121 address of a particular network interface. The address is assigned by the X.25 network supplier.

- *X.121-address*—Variable-length X.121 address.

For example:

```
x25 address 31370054065
```

x25 bfe-decision {**no** | **yes** | **ask**}

Indicates decision criteria for **x25 bfe-emergency decision** command.

- **no**—Router will not participate in decision to enter or leave emergency mode.
- **yes**—Router will participate in decision to enter emergency mode.
- **ask**—Router will prompt for EXEC command to place it in or out of emergency mode.

For example:

```
x25 bfe-decision ask
```

x25 bfe-emergency {**never** | **always** | **decision**}

Specifies the circumstances under which the router enters Blacker Front End Emergency (BFE) mode.

- **never**—Router never goes into mode (default).
- **always**—Router enters when directed by the BFE.
- **decision**—Router waits until it receives a diagnostic packet from the BFE device.

For example:

```
x25 bfe-emergency always
```

[**no**] **x25 default** {**ip** | **pad**}

Specifies or removes a protocol by which the router interprets calls with unknown call user data. The protocol is either **ip** or **pad**.

[**no**] **x25 facility** *keyword argument*

Overrides interface settings on a per-call basis. This enables X.25 facilities that are sent between DTE and DCE devices to negotiate certain link parameters. The **no** form of the command, with keyword and argument, removes the facility.

- *keyword argument*—Choose one of the following keyword-argument pairs:

  cug *number*—Specifies a Closed User Group number from 1 through 99 to provide an extra measure of network security.

  packetsize *in-size out-size*—Sets the size in bytes of input packets (*in-size*) and output packets (*out-size*). Both values should be the same.

  reverse—Reverses charges on all Call Request packets from the interface.

windowsize *in-size out-size*—Sets the packet count for input windows (*in-size*) and output windows (*out-size*). Both values should be the same.

throughput *in out*—Sets the requested throughput values for input and output throughput across the network.

rpoa *name*—Specifies the list of transit recognized private operating agencies (RPOAs) to use in outgoing Call Request packets.

transit-delay *number*—Specifies the transit delay value in milliseconds (0 through 65334) for the mapping in of outgoing calls.

For example:

```
x25 facility cug 1
x25 facility transit-delay 10
```

x25 hic *circuit-number*

Sets the highest incoming-only virtual circuit number. Default is 0.

- *circuit-number*—Virtual circuit number from 1 through 4095; 0 disables the range.

For example:

```
x25 hic 10
```

x25 hoc *circuit-number*

Sets the highest outgoing-only virtual circuit number. Default is 0.

- *circuit-number*—Virtual circuit number from 1 through 4095; 0 disables the range.

For example:

```
x25 hoc 2048
```

[**no**] **x25 hold-queue** *queue-size*

Defines the number of packets the router can hold until a virtual circuit is established. The **no** form restores the default of 0.

- *queue-size*—Number of packets.

For example:

```
x25 hold-queue 3
```

[**no**] **x25 hold-vc-timer** *minutes*

Prevents overruns on X.25 switches for traffic through the virtual circuits (VCs) for a specified period. When this command is activated, incoming calls are still accepted. The **no** form restores the default of 0.

- *minutes*—Number of minutes to prevent calls to a previously failed destination.

For example:

```
x25 hold-vc-timer 1
```

x25 htc *circuit-number*

Sets the highest two-way virtual circuit number. Default is 1024 for X.25.

- *circuit-number*—Virtual circuit number from 1 through 4095; 0 disables the range.

For example:

```
x25 htc 512
```

[**no**] **x25 idle** *minutes*

Clears an SVC after a set period of inactivity. Affects calls both originated and terminated by the router. The **no** form restores the default of 0 minutes.

- *minutes*—Number of minutes in the period. Both calls originated and terminated by the router are cleared.

For example:

```
x25 idle 1
```

[**no**] **x25 ip-precedence**

Enables or disables the router's ability to open a new virtual circuit based on the IP Type of Service (TOS) field. By default, the router opens one virtual circuit for each type of service.

x25 ips *bytes*

Sets the router input packet size to match those of the network. Default is 128 bytes.

- *byte*—Byte count from 16 through 1024. Larger packet sizes are better. Use the same byte value for **x25 ips** and **x25 ops** unless your network supports asymmetry between input and output packets.

For example:

```
x25 ips 1024
```

x25 lic *circuit-number*

Sets the lowest incoming-only virtual circuit number. Default is 0.

- *circuit-number*—Virtual circuit number from 1 through 4095; 0 disables the range.

For example:

```
x25 lic 2
```

[**no**] **x25 linkrestart**

Forces a packet-level restart when the link level is restarted. Restarts X.25 Level 2 (LAPB) when errors occur. The **no** form turns off this behavior. Default is enabled.

x25 loc *circuit-number*

Sets the lowest outgoing-only virtual circuit number. Default is 0.

- *circuit-number*—Virtual circuit number from 1 through 4095; 0 disables the range.

For example:

```
x25 loc 2000
```

x25 ltc *circuit-number*

Sets the lowest two-way virtual circuit. Default is 1.

- *circuit-number*—Virtual circuit number from 1 through 4095; 0 disables the range.

For example:

```
x25 ltc 20
```

[**no**] **x25 map** *protocol-keyword protocol-address X.121-address [option1... option6*]

Specifies a protocol-to-X.121 address mapping, such as Internet-to-X.121 or AppleTalk-to-X.121.

- *protocol-keyword*—Protocol type: **ip**, **novell**, **appletalk**, **bridge**, or **compressedtcp**.
- *protocol-address*—Protocol address to be mapped.
- *X.121-address*—X.121 address to which the protocol address will be mapped.
- *option*—Choose up to six of the following mapping features for the *option* argument:

  accept-reverse—Instructs the router to accept incoming reverse-charged calls. If this option is not present, the router clears reverse-charged calls.

  broadcast—Instructs the router to direct any broadcasts sent through this interface to the specified X.121 address. This option is needed when dynamic routing protocols are being used to access the X.25 network.

  cug *number*—Specifies a Closed User Group number (from 1 through 99) for the mapping in the outgoing call.

  modulo *size*—Specifies the maximum window size for this map. The argument *size* permits windows of 8 or 128 on the same interface.

  nuid *username password*—Specifies that a network ID facility be sent in the outgoing call with the specified username and password.

  nvc *count*—Sets the number of virtual circuits (VCs) for this protocol/host. The default *count* is the **x25 nvc** setting of the interface. A maximum number of eight VCs can be configured for a single protocol/host.

  packetsize *in-size out-size*—Specifies input packet size (*in-size*) and output packet size (*out-size*) for the mapping in the outgoing call.

  reverse—Specifies reverse charging for outgoing calls.

  rpoa—Specifies the list of transit recognized private operating agencies to use in outgoing Call Request packets for this entry.

  throughput *in out*—Requests the amount of bandwidth through the X.25 network.

  transit-delay *number*—Specifies the transit delay value in milliseconds (0 through 65334) for the mapping in of outgoing calls. Used only for networks that support delay transit.

windowsize *in-size out-size*—Specifies input window size (*in-size*) and output window size (*out-size*) for the mapping in the outgoing call.

For example:

```
x25 map ip 131.108.9.2 31370054065 reverse broadcast nvc 4
```

x25 map bridge *X.121-address* **broadcast** [*options-keywords*]

Specifies Internet-to-X.121 mapping.

- *X.121-address*—X.121 address.
- **broadcast**—Bridges X.25 frames.
- *options-keywords*—Services that can be added to this map. See the **x25 map** command for options.

For example:

```
x25 map bridge 31370054065 broadcast
```

[**no**] **x25 map** *NSAP* {*MAC-address* | *X.121-address*}

Maps NSAP addresses to either MAC-layer addresses or X.121 addresses. Required after specifying X.25 encapsulation on a serial interface. The **no** form with address arguments cancels the mapping.

- *NSAP*—DTE NSAP address or NSAP prefix of NSAP address.
- *MAC-address*—MAC address.
- *X.121-address*—X.121 address.

For example:

```
x25 map cmns 38.8261.17 0800.4e02.1f9f
```

[**no**] **x25 map compressedtcp** *IP-address X.121-address* [*options*]

Specifies a network protocol-to-X.121 address mapping, such as Internet-to-X.121 or AppleTalk-to-X.121. This command is required to make the X.25 calls complete for compressed packets. The **no** form disables header compression for the link.

- *IP-address*—IP address.
- *X.121-address*—X.121 address.
- *options*—See the **x25 map** command for options.

For example:

```
x25 map compressed 131.108.9.2 31370054065
```

x25 modulo *modulus*

Sets the modulus. The value of the modulo parameter must agree with that of the device on the other end of the X.25 link. Default is 8.

- *modulus*—8 or 128.

For example:

```
x25 modulo 128
```

x25 nvc *count*

Specifies the maximum number of switched virtual circuits that can be open to one host simultaneously. Default is 1.

- *count*—Circuit count from 1 through 8.

For example:

```
x25 nvc 3
```

x25 ops *bytes*

Sets the router output packet size to match that of the network. Default is 128 bytes.

- *byte*—Byte count from 16 through 1024. Larger packet sizes are better because smaller packets require more overhead processing. Use the same byte value for **x25 ips** and **x25 ops** unless your network supports asymmetry between input and output packets.

For example:

```
x25 ips 1024
```

[**no**] **x25 pvc** *circuit protocol-keyword protocol-address*

Establishes or deletes Permanent Virtual Circuits (PVCs). You must specify the required network protocol-to-X.121 address mapping with an **x25 map** subcommand before you can set up a PVC.

- *circuit*—Virtual circuit channel number. Must be lower than the lower limit of the incoming call range in the virtual circuit channel sequence (set using the **lic** keyword).
- *protocol-keyword*—Protocol type: **ip**, **novell**, **appletalk**, or **bridge**.
- *protocol-address*—Protocol address of the host at the other end of the PVC.

For example:

```
x25 pvc 3 ip 131.108.1.4
x25 pvc 2 novell 00c0.0123.4567
```

[**no**] **x25 pvc** *pvc-number1* **interface** *interface-name* **pvc** *pvc-number2* [*options*]

Configures a PVC for a given interface.

- *pvc-number*—The first PVC number is the number used on the local interface; the second is the number on the remote interface.
- **interface** *interface-name*—Remote interface type and unit number.
- *options*—The **windowsize** and **packetsize** options can be executed; see the **x25 map** command options for syntax.

For example:

```
x25 pvc 2 serial 0 2
```

[**no**] **x25 pvc** *pvc-number1* **tunnel** *IP-address* **interface serial** *unit* **pvc** *pvc-number2* [*options*]

Configures a PVC for remote X.25 switching (tunneling).

- *pvc-number*—PVC number. The first PVC number is the number initiating the connection; the second is the target PVC number.

- **tunnel**—Specifies X.25 switching.
- *IP-address*—Address of the router.
- **interface serial** *unit*—Serial interface port.
- **pvc**—Specifies the PVC connection for the target device.
- *options*—See the **x25 map** command options in the section "LAPB and X.25 Interface Subcommands."

For example:

```
x25 pvc 1 tunnel 131.108.1.2 interface serial 1 pvc 2
```

[**no**] **x25 remote-red** *host-IP-address* **remote-black** *Blacker-IP-address*

Sets up a table listing BFE nodes to which the router will send packets.

- *host-IP-address*—IP address of a host or router to which packets are sent.
- **remote-black**—Specifies remote Blacker front end unit.
- *Blacker-IP-address*—IP address of remote Blacker front end unit in front of the host to which packets are sent.

For example:

```
x25 remote-red 21.0.0.12 remote-black 21.0.01
```

[**no**] **x25 rpoa** *name number*

Specifies a list of transit recognized private operating agencies (RPOAs) to use, referenced by name.

[**no**] **x25 suppress-called-address**

Omits the called (destination) X.121 address in Call Request packets. This option is required for networks that expect only subaddresses in the called address field. The **no** form resets the default, which is to send the calling address.

[**no**] **x25 suppress-calling-address**

Omits the calling (source) X.121 address in Call Request packets. This option is required for networks that expect only subaddresses in the calling address field. The **no** form resets the default, which is to send the calling address.

x25 t10 *seconds*

Sets the limit for the Restart Request retransmission timer (T10) on DCE devices. Default is 60 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t10 90
```

x25 t11 *seconds*

Sets the limit for the Call Request retransmission timer (T11) on DCE devices. Default is 180 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t11 90
```

x25 t12 *seconds*

Sets the limit for the Reset Request retransmission timer (T12) on DCE devices. Default is 60 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t12 90
```

x25 t13 *seconds*

Sets the limit for the Clear Request retransmission timer (T13) on DCE devices. Default is 60 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t13 90
```

x25 t20 *seconds*

Sets the limit for the Restart Request retransmission timer (T20) on DTE devices. Default is 180 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t20 90
```

x25 t21 *seconds*

Sets the limit for the Call Request retransmission timer (T21) on DTE devices. Default is 200 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t21 220
```

x25 t22 *seconds*

Sets the limit for the Reset Request retransmission timer (T22) on DTE devices. Default is 180 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t22 100
```

x25 t23 *seconds*

Sets the limit for the Clear Request retransmission timer (T23) on DTE devices. Default is 180 seconds.

- *seconds*—Number of seconds.

For example:

```
x25 t23 200
```

x25 th *delay*

Instructs the router to send acknowledgment packets when it is not busy sending other packets, even if the number of input packets has not reached the **win** count. The router sends acknowledgment packets when the number of input packets reaches the count you specify, providing there are no other packets to send. This command improves line responsiveness at the expense of bandwidth. Default is 0.

- *delay*—Number of input packets, from 0 to the input window size. The value 1 instructs the router to send an acknowledgment for each packet.

For example:

```
x25 th 1
```

[**no**] **x25 use-source-address**

Updates the source address of outgoing calls forwarded over a specific interface. The **no** form prevents the update.

x25 {**win** | **wout**} *packets*

Sets the upper limits on the number of outstanding unacknowledged packets. Set **win** and **wout** to the same value unless your network supports asymmetry between input and output window sizes. Default is 2.

- **win**—Use the keyword **win** to specify the upper limits of the number of outstanding unacknowledged packets in the input window.
- **wout**—Use the keyword **wout** to specify the upper limits of the number of outstanding unacknowledged packets in the output window.
- *packets*—Packet count. For **win**, defines how many packets the router can receive before sending an X.25 acknowledgment. For **wout**, defines how many sent packets can remain unacknowledged before the router uses a hold queue. The value must be between one and modulus minus one.

For example:

```
x25 win 3
x25 wout 3
```

X.25 Show Commands

Table 4-7 lists the X.25 **show** commands.

Table 4-7 X.25 Show Commands

Command	Display
show imp-hosts	Information about HDH transactions.
show x25 ma	Network protocol-to-X.121 address mapping.
show x25 remote-reds	One-to-one mapping of the host IP addresses and remote BFE IP addresses.
show x25 vc	Virtual circuit parameters and statistics.

Protocol Configuration

Protocol configuration includes the following sections:

- AppleTalk Global Configuration Commands
- AppleTalk Interface Subcommands
- IP and SLIP Global Configuration Commands
- IP Interface Subcommands
- IP Line Subcommand
- Serial Line IP (SLIP) EXEC Command
- Serial Line IP (SLIP) Line Subcommands
- IP Routing Protocol Global Configuration Commands
- IP Routing Protocol Interface Subcommands
- IP Routing Protocol Router Subcommands
- Novell Global Commands
- Novell Interface Subcommands

AppleTalk Global Configuration Commands

access-list *list* {**permit** | **deny**} **additional-zones**

Establishes an AppleTalk access control list (ACL) for zone-related checks to specify the default action for zones that were not enumerated. Default is deny additional zones.

- *list*—An integer between 600 and 699.
- **permit** or **deny**—Specifies the permit or deny condition.

For example:

```
access-list 600 permit additional-zones
```

[**no**] **access-list** *list* {**permit** | **deny**} **cable-range** *start-end*

Establishes an ACL for an extended network. Affects extended networks with starting and ending numbers exactly matching those specified in the command.

- *list*—An integer between 600 and 699.
- **permit** or **deny**—Specifies the permit or deny condition.
- *start-end*—The cable range.

For example:

```
access-list 600 permit cable-range 1000-1010
```

[**no**] **access-list** *list* {**permit** | **deny**} **includes** *start-end*

Establishes an ACL for any network, extended or nonextended, which overlaps any part of the specified range.

- *list*—An integer between 600 and 699.
- **permit** or **deny**—Specifies the permit or deny condition.
- *start-end*—The cable range.

For example:

```
access-list 600 permit includes 1000-1010
```

[**no**] **access-list** *list* {**permit** | **deny**} **network** *network*

Establishes an AppleTalk access control list (ACL) for a single network number. The ACL affects matching nonextended networks and extended networks with the same starting and ending number.

- *list*—An integer between 600 and 699.
- **permit** or **deny**—Specifies the permit or deny condition.
- *network*—AppleTalk network number.

For example:

```
access-list 600 permit network 21
```

[**no**] **access-list** *list* {**permit** | **deny**} **other-access**

Establishes an ACL used as the default for any case not enumerated. Default is deny other access.

[**no**] **access-list** *list* {**permit** | **deny**} **within** *start-end*

Establishes an ACL for any network, extended or nonextended, bounded by the specified range. The *start* and *end* numbers are considered to be within the range.

- *list*—An integer between 600 and 699.
- **permit** or **deny**—Specifies the permit or deny condition.
- *start-end*—The cable range.

For example:

```
access-list 600 permit within 1000-1010
```

[**no**] **access-list** *list* {**permit** | **deny**} **zone** *zone*

Establishes an ACL that applies to any network that has the specified *zone* in its zone list.

- *list*—An integer between 600 and 699.
- **permit** or **deny**—Specifies the permit or deny condition.
- *zone*—AppleTalk zone name.

For example:

```
access-list 600 deny zone Twilight
```

no appletalk arp

Resets the **arp interval** and **arp retransmit** commands to their default values.

appletalk arp [**probe** | **request**] **retransmit-count** *count*

Specifies the number of times the router will retransmit an ARP packet before abandoning address negotiations and using the selected address. Default is 20.

- **probe**—Sets parameters associated with the router's dynamic address assignment.
- **request**—Sets parameters that the router uses to resolve another node's address.
- *count*—Transmission count. The minimum value is 1.

For example:

```
appletalk arp retransmit-count 25
```

[**no**] **appletalk arp interval** *milliseconds*

Specifies the interval between retransmission of ARP packets. Default is 33 milliseconds.

- *milliseconds*—Number of milliseconds in the interval. Must be 33 or greater.

For example:

```
appletalk arp interval 100
```

[**no**] **appletalk checksum**

Enables or disables the generation and verification of checksums for all AppleTalk packets except routed packets. Default is enabled.

[**no**] **appletalk event-logging**

Logs significant events using the logger facility. Logged events include routing changes, zone creation, port status, and address.

[**no**] **appletalk lookup-type** *service-type*

Specifies services listed in the **show apple nbp** and **show apple name-cache** EXEC command display. The **no** form with arguments removes the specified service type from the name cache. The **no** form without arguments removes all names except those relating to the router.

- *service-type*—Type of AppleTalk service.

[**no**] **appletalk macip dynamic** *IP-address* [*IP-address*] **zone** *server-zone*

Allocates a single IP address or a range of IP addresses for assignment to *dynamic* MacIP clients by the MacIP server. The **no** form with arguments removes the specified dynamic address assignment statement from the configuration; without arguments, it shuts down all running MacIP services.

- *IP-address*—The IP address. To specify a range, supply the first and last IP addresses separated by a space.
- *server-zone*—The name of the zone containing the MacIP server.

For example:

```
appletalk macip dynamic 131.108.1.28 131.108.1.44 zone Engineering
```

[**no**] **appletalk macip server** *IP-address* **zone** *server-zone*

Establishes a new MacIP server. The **no** form with arguments removes a server statement from the configuration; without arguments, it shuts down all running MacIP services.

- *IP-address*—The IP address. You can optionally specify a range by supplying the first and the last IP address.
- *server-zone*—The name of the zone containing the MacIP server.

For example:

```
appletalk macip server 131.108.1.27 zone Engineering
```

[**no**] **appletalk macip static** *IP-address* [*IP-address*] **zone** *server-zone*

Defines a range of addresses to be made available to MacIP clients that have reserved invariant IP addresses. The **no** form with arguments removes the specified static address assignment statement from the configuration; without arguments, it shuts down all running MacIP services.

- *IP-address*—The IP address. You can optionally specify a range by supplying the first and the last IP address.
- *server-zone*—The name of the zone containing the MacIP server.

For example:

```
appletalk macip static 131.108.1.50 131.108.1.66 zone Engineering
appletalk macip static 131.108.1.81 zone Engineering
```

[**no**] **appletalk name-lookup-interval** *seconds*

Sets or cancels the interval between service polls by the router on its AppleTalk interfaces. The value 0 or the **no** form disables name lookup. Default is 0.

- *seconds*—Number of seconds.

For example:

```
appletalk name-lookup-interval 1200
```

[**no**] **appletalk permit-partial-zones**

Permits partial zones. Even though a network of a zone is denied, the zone is permitted. Default is disabled.

[**no**] **appletalk proxy-npb** *network-number zonename*

Assigns a proxy. Required for each zone that has a nonextended-only AppleTalk router connected to a network in the zone.

- *network-number*—Unique network number that the router will advertise as if it were a real network number.
- *zonename*—Name of the zone requiring compatibility support. Only one proxy is needed to support a zone, but additional proxies can be defined with different network numbers if redundancy is desired.

For example:

```
apple proxy-npb 60 Twilight
```

[**no**] **appletalk require-route-zones**

Prevents fake routes (possibly generated by a broken router or corrupt packet) from causing ZIP protocol storms. Requires the router to know the zone name for a route before including it in an update. Default is enabled.

[**no**] **appletalk routing**

Enables or disables AppleTalk protocol processing.

[**no**] **appletalk strict-rtmp**

Enforces maximum checking of routing packets to ensure their validity.

[**no**] **appletalk timers** *update-interval valid-interval invalid-interval*

Changes the intervals used in AppleTalk routing.

- *update-interval*—Number of seconds between routing updates sent to other routers on the network. Default is 10 seconds.
- *valid-interval*—Number of seconds that the router will consider a route valid without having heard a routing update for that route. The value is normally twice the *update-interval*. Default is 20 seconds.
- *invalid-interval*—Number of seconds that the router will wait before marking a route invalid; the default is three times the *valid-interval*, or 60 seconds.

For example:

```
appletalk timers 20 40 120
```

AppleTalk Interface Subcommands

[**no**] **appletalk access-group** *access-list-number*

Creates a *packet filter*, which prevents any packets from being sent out an interface if the destination network has access denied. Once assigned, any packet that fails the **appletalk access-list** command cannot go out on that interface.

- *access-list-number*—Number of an access list in the range 600 through 699. If an undefined access list is used, the rule defaults to **permit**. If the condition is not handled by the specified access list, the rule defaults to **deny** unless permitted via the **other-access** option of the **access-list** global configuration command.

For example:

```
appletalk access-group 699
```

[**no**] **appletalk address** *address*

Assigns AppleTalk addresses on the interfaces that will be used for the AppleTalk protocol. Used to configure nonextended interfaces.

- *address*—AppleTalk address.

For example:

```
appletalk address 1.129
```

[**no**] **appletalk cable-range** *start-end* [*network.node*]

Designates an interface as being on an extended AppleTalk network.

- *start-end*—First and last network in the range expressed as decimal numbers between 1 and 65279, inclusive. The arguments *start* and *end* can be assigned the same number.
- *network.node*—Network and node number that the router should first use to select the AppleTalk address for this interface.

For example:

```
appletalk cable-range 2-2
```

[**no**] **appletalk discovery**

Resets the discovery mode and allows a new cable range to be discovered.

appletalk distribute-list *access-list-number* **in**

Filters input from the networks so that AppleTalk network numbers specified by the *access-list-number* argument will not be inserted into the router's AppleTalk routing table when routing updates are received. The **no** form removes this filter.

- *access-list-number*—Number of a predefined access list in the range 600 through 699.

For example:

```
appletalk distribute-list 601 in
```

[**no**] **appletalk distribute-list** *access-list-number* **out**

Filters routing data generated from zones or networks. The **no** form removes the filter.

- *access-list-number*—Access list number in the range 600 through 699. If an undefined access list is used, the rule defaults to **permit**. If the condition is not handled by the specified access list, the rule defaults to **deny** unless permitted via the **other-access** option of the **access-list** global configuration command.

For example:

```
appletalk distribute-list 655 out
```

[**no**] **appletalk getzonelist-filter** *list*

Modifies zone-list replies.

- *list*—Access list number in the range 600 through 699. If an undefined access list is used, the rule defaults to **permit**. If the condition is not handled by the specified access list, the rule defaults to **deny** unless permitted via the **additional-zones** option of the **access-list** global configuration command.

For example:

```
appletalk getzonelist-filter 600
```

appletalk iptalk *net.node zone*

Encapsulates AppleTalk in IP packets in a manner compatible with the Columbia AppleTalk Package (CAP) IPtalk and the Kinetics IPtalk (KIP) implementation.

- *net.node*—Network node number.
- *zone*—AppleTalk zone name.

For example:

```
appletalk iptalk 30.0 UDPzone
```

appletalk iptalk-baseport *port-number*

Specifies the UDP port number, which is the beginning of the range of UDP ports used in mapping AppleTalk well-known DDP socket numbers to UDP ports.

- *port-number*—UDP port number.

For example:

```
appletalk iptalk-baseport 200
```

[**no**] **appletalk send-rtmp**

Allows a router to be placed on a network with AppleTalk so it is enabled but not seen. This allows disabling of routing updates.

[**no**] **appletalk zone** *zonename*

Sets the zone name for the connected AppleTalk network. Must be specified after the **appletalk address** or **appletalk cable-range** command if discovery is not enabled. This command can be issued multiple times if it follows the **appletalk cable-range** command.

- *zonename*—Specifies the zone name for the connected AppleTalk network.

For example:

```
appletalk zone twilight
```

AppleTalk Show Commands

Table 4-8 lists the AppleTalk **show** commands.

Table 4-8 AppleTalk Show Commands

Command	Display
show apple access-lists	Conditions specified in AppleTalk access list configurations
show apple adjacent-routes	Routes that are directly connected or one hop away
show apple arp	AppleTalk ARP cache
show apple cache	Current AppleTalk fast-switching cache
show apple global	AppleTalk internetwork and router parameter information
show apple interface [*interface*]	AppleTalk parameters that have been applied to the interface
show apple macip-clients	Status of known MacIP clients
show apple macip-servers	Status of MacIP servers
show apple name-cache	List of NBP (Name Binding Protocol) services of nearby routers or other devices
show apple nbp	NBP name registration table
show apple neighbor [*address*]	AppleTalk routers directly connected to any network on which this router is connected
show apple route [*network*]	Routing table for AppleTalk networks
show apple socket [*socket*]	Process-level processing on all sockets in the AppleTalk interface
show apple traffic	AppleTalk protocol statistics
show apple zone	Zone information table

IP and SLIP Global Configuration Commands

[**no**] **access-list** *list* {**permit** | **deny**} *IP-address wildcard-mask*

Creates or removes an IP access list.

- *list*—An IP list number from 1 through 99.
- **permit** or **deny**—Specifies permit or deny condition for this list.
- *IP-address*—IP address to which the router compares the address being tested.
- *wildcard-mask*—Wildcard mask bits for the address in 32-bit, dotted decimal notation.

For example:

```
access-list 1 permit 192.5.34.0 0.0.0.255
```

[**no**] **access-list** *list* {**permit** | **deny**} *protocol source source-mask destination destination-mask* [*operator operand*] [**established**]

Creates or removes an extended IP access list.

- *list*—An IP list number from 100 through 199.
- **permit** or **deny**—Specifies permit or deny condition for this list.
- *protocol*—One of the supported protocol keywords: **ip**, **tcp**, **udp**, or **icmp**.
- *source*—An IP address in 32-bit, dotted decimal notation.
- *source-mask*—Mask bits for the source address in 32-bit, dotted decimal notation.
- *destination*—Destination address in 32-bit, dotted decimal notation.
- *destination-mask*—Destination address mask in 32-bit, dotted decimal notation.
- *operator*—If **tcp** or **udp** is the protocol, use these optional arguments to compare destination ports, service access points, or contact names. Specify **lt** (less than), **gt** (greater than), **eq** (equal to), or **neq** (not equal).
- *operand*—If **tcp** or **udp** is the protocol, specify the decimal destination port for the specified protocol.
- **established**—For the TCP protocol, use the **established** keyword to match TCP datagrams that have the ACK or RST bits set.

For example:

```
access-list 189 permit tcp 128.88.0.0 0.0.255.255   0.0.0.0 255.255.255.255
access-list 190 permit tcp  0.0.0.0 255.255.255.255   128.88.1.2  eq  25
```

[**no**] **arp** *IP-address hardware-address type* [**alias**]

Installs a permanent entry in the ARP cache. The router uses this entry to translate 32-bit Internet Protocol addresses into 48-bit hardware addresses.

- *IP-address*—The Internet address that corresponds to the local data-link address specified by the argument *hardware-address*.
- *hardware-address*—Local data-link address.
- *type*—Encapsulation description: **arpa** for Ethernet interfaces or **snap** for Token Ring interfaces.
- **alias**—Supply this keyword if the router should respond to ARP requests as if it were the owner of the specified IP address.

For example:

```
arp 192.31.7.19 0800.0900.1834 arpa
```

[**no**] **async-bootp** *tag* [*:hostname*] *data*

Specifies extended BootP requests defined in RFC 1084 when the router is configured for SLIP. If no extended BootP commands are executed, by default the software generates a gateway and subnet mask appropriate for the local network.

- *tag*—The argument *tag* is the item being requested and is one of the following expressed as filename, integer, or IP dotted decimal address:

  bootfile—Specifies use of a server boot file from which to download the boot program. Use the optional *:hostname* and *data* arguments to specify the filename.

subnet-mask *mask*—Dotted decimal address specifying the network and local subnetwork mask (as defined by RFC 950).

time-offset *offset*—A signed 32-bit integer specifying the time offset of the local subnetwork in seconds from Universal Time Coordinated (UTC).

gateway *address*—Dotted decimal address specifying the IP addresses of gateways for this subnetwork. A preferred gateway should be listed first.

time-server *address*—Dotted decimal address specifying the IP address of time servers (as defined by RFC 868).

IEN116-server *address*—Dotted decimal address specifying the IP address of name servers (as defined by IEN 116).

DNS-server *address*—Dotted decimal address specifying the IP address of Domain Name Servers (as defined by RFC 1034).

log-server *address*—Dotted decimal address specifying the IP address of an MIT-LCS UDP log server.

quote-server *address*—Dotted decimal address specifying the IP address of Quote of the Day servers (as defined in RFC 865).

lpr-server *address*—Dotted decimal address specifying the IP address of Berkeley UNIX Version 4 BSD servers.

impress-server *address*—Dotted decimal address specifying the IP address of Impress network image servers.

rlp-server *address*—Dotted decimal address specifying the IP address of Resource Location Protocol (RLP) servers (as defined in RFC 887).

hostname *name*—The name of the client (which may or may not be domain qualified, depending upon the site).

bootfile-size *value*—A 2-octet value specifying the number of 512-octet (byte) blocks in the default boot file.

- *:hostname*—Host to which this entry applies, expressed as either an IP address or logical host name.
- *data*—List of IP addresses entered in dotted decimal notation or as logical host names, a number, or a quoted string.

For example:

```
async-bootp bootfile :128.128.1.1 “pcboot”
async-bootp bootfile :mac “macboot”
async-bootp subnet-mask 255.255.0.0
```

[**no**] **ip accounting-list** *IP-address mask*

Specifies a set of filters to control accounting information for hosts. The **no** form removes this filter.

- *IP-address*—IP address for the host.
- *mask*—Mask with which the source and destination address of each IP datagram is logically ANDed to determine whether there is a match.

For example:

```
ip accounting-list 192.31.7.18 255.255.0.0
```

[**no**] **ip accounting-threshold** *threshold*

Sets the maximum number of accounting entries to be created. The **no** form removes this limit.

- *threshold*—Maximum number of accounting entries that can be created.

For example:

```
ip accounting-threshold 500
```

[**no**] **ip accounting-transits** *count*

Controls the number of transit records that will be stored in the IP accounting database. Transit entries are those that do not match any of the filters specified by **ip-accounting-list** commands.

- *count*—Maximum number of transit records.

For example:

```
ip accounting-transits 100
```

[**no**] **ip domain-list** *name*

Defines a list of default domain names to complete unqualified host names. The **no** form deletes a domain name from the list.

- *name*—Domain name to add to or delete from the list.

For example:

```
ip domain-list cisco.com
```

[**no**] **ip domain-lookup**

Enables or disables IP Domain Name System-based hostname-to-address translation. The **no** form disables the feature. Default is enabled.

[**no**] **ip domain-name** *name*

Defines the default domain name, which is specified by the argument name. The router uses the default domain name to complete names without a dotted domain name. The **no** form deletes the default domain name.

- *name*—Default domain name.

For example:

```
ip domain-name cisco.com
```

[**no**] **ip forward-protocol** {**udp** | **nd**} [*port*]

Specifies which protocols and ports are forwarded for an interface with an **ip helper-address**. The **no** form disables forwarding of the specified protocol.

- **udp** or **nd**—Specify **udp** for UDP protocol or **nd** for the ND protocol used by older diskless Sun workstations.
- *port*—If you specified UDP protocol, optionally specify a UDP destination port to control which UDP services are forwarded.

For example:

```
ip forward-protocol udp
```

[**no**] **ip forward-protocol spanning-tree**

Permits IP broadcasts to be flooded throughout the internetwork in a controlled fashion. The **no** form prevents flooding.

[**no**] **ip host** *name* [*TCP-port-number*] *IP-address1* | [*IP-address2...IP-address8*]

Defines a static hostname-to-address mapping in the host cache.

- *name*—Host name.
- *TCP-port-number*—TCP port number. Default is 23 (Telnet).
- *IP-address*—IP address associated with the host name. Up to eight addresses can be supplied.

For example:

```
ip host croff 192.31.7.18
```

[**no**] **ip hp-host** *hostname IP-address*

Enables or disables the use of the proxy service.

- *hostname*—Name of the Hewlett-Packard host in the host table.
- *IP-address*—IP address of the host.

For example:

```
ip hp-host bl4zip 131.24.6.27
```

[**no**] **ip ipname-lookup**

Specifies or removes the IP IEN-116 Name Server hostname-to-address translation. Default is disabled.

[**no**] **ip name-server** *server-address 1* [*server-address 2...server-address 6*]

Specifies the addresses of the name servers to use for name and address resolution. Default: all-ones broadcast address (255.255.255.255).

- *server-address*—Internet addresses of up to six name servers in dotted decimal format.

For example:

```
ip name-server 131.108.1.111 131.108.1.2
```

[**no**] **ip routing**

Enables or disables IP routing. If the system has optional bridging-enabled software, use the **no** form to set up a system to bridge (not route) IP datagrams. Default is enabled.

[**no**] **ip source-route**

Controls the handling of IP datagrams with source routing header options. The **no** form instructs the system to discard IP datagrams containing a source-route option. Default is enabled.

[**no**] **ip subnet-zero**

Enables or disables the ability to configure and route to “subnet zero” subnets. Default is disabled.

IP Interface Subcommands

[**no**] **arp** {**arpa | probe | snap**}

Controls the interface-specific handling of IP address resolution into 48-bit Ethernet and Token Ring hardware addresses. Default is **arpa**.

- **arpa**—Specifies standard Ethernet-style ARP (RFC 826).
- **probe**—Specifies the HP Probe for IEEE-802.3 networks.
- **snap**—Specifies ARP packets conforming to RFC 1042.

For example:

```
arp probe
```

[**no**] **arp timeout** *seconds*

Sets the number of seconds an ARP cache entry will stay in the cache. The **no** form restores the default of 14,400 seconds (4 hours).

- *seconds*—Number of seconds used to age an ARP cache entry for this interface.

For example:

```
arp timeout 7200
```

[**no**] **ip access-group** *list*

Defines an IP access group.

- *list*—Standard or extended IP access list number from 1 through 199.

For example:

```
access-group 101
```

[**no**] **ip accounting**

Enables or disables IP accounting on an interface.

[**no**] **ip address** *IP-address net-mask* [**secondary**]

Sets an IP address for an interface.

- *IP-address*—IP address.
- *net-mask*—Subnet mask for the associated network. The subnet mask must be the same for all interfaces connected to subnets of the same network.
- **secondary**—Include this keyword for all IP addresses other than the first.

For example:

```
ip address 131.108.1.27 255.255.255.0
ip address 192.31.7.17 255.255.255.0 secondary
```

[**no**] **ip broadcast-address [***IP-broadcast-address***]**

Defines a broadcast address. If you use the **no** form or do not specify a broadcast address, the system uses the default of all ones (255.255.255.255).

- *IP-broadcast-address*—IP broadcast address for the network.

For example:

```
ip broadcast-address 192.195.78.48
```

[**no**] **ip directed-broadcast**

Enables or disables forwarding of directed broadcasts on the interface. Default is enabled.

[**no**] **ip helper-address** *address*

Defines a helper address for a specified address. The helper address defines the selective forwarding of UDP broadcasts received on the interface. The **no** form deletes the helper address.

- *address*—Destination broadcast or host address that the router should use when forwarding datagrams.

For example:

```
ip helper-address 128.24.17.111
```

[**no**] **ip mask-reply**

Sets the interface to send ICMP Mask Reply messages. Default is disabled.

[**no**] **ip mtu** *bytes*

Sets the maximum transmission unit (MTU) or size of IP packets sent on an interface. The **no** form restores the default, which depends on the interface medium.

- *bytes*—Maximum packet size for this interface from 128 through one less than the maximum for the interface.

For example:

```
ip mtu 300
```

[**no**] **ip probe proxy**

Enables or disables HP Probe support, which allows a router to respond to HP Probe Proxy Name requests. Default is disabled.

[**no**] **ip proxy arp**

Enables or disables proxy ARP on the interface. Default is enabled.

[**no**] **ip redirects**

Enables or disables the sending of ICMP redirects on this interface. Default is enabled.

[**no**] **ip route-cache**

Controls the use of outgoing packets on a high-speed switching cache for IP routing. The cache is enabled by default and allows load-balancing for individual destinations; autonomous switching is disabled by default. The **no** form disables fast-switching, enabling load-balancing on a per-packet basis.

[**no**] **ip security**

Restores an interface to its default state, dedicated, unclassified Genser, with no extended state allowed.

[**no**] **ip security add**

Adds a basic security option to all datagrams leaving the router on the specified interface. The **no** form disables this function.

ip security dedicated *level authority* [*authority...*]

Sets or removes the requested level of classification and authority on the interface.

- *level*—Degree of sensitivity of information: **reserved4**, **TopSecret**, **Secret**, **Confidential**, **Reserved3**, **Reserved2**, **Unclassified**, or **Reserved1**.
- *authority*—Organization that defines the set of security levels that will be used in a network: **Genser**, **Sio-Esi**, **SCI**, or **NSA**.

For example:

```
ip security dedicated confidential Genser
```

[**no**] **ip security extended-allowed**

Allows or rejects datagrams with an extended security option on the specified interface.

[**no**] **ip security first**

Prioritizes the presence of security options on a datagram.

[**no**] **ip security ignore-authorities**

Sets an interface to ignore the authority fields of all incoming datagrams. The **no** form removes the setting.

[**no**] **ip security implicit-labelling** [*level authority* [*authority* [*authority...*]]]

Sets the interface to accept datagrams, even if the packets do not include a security option. The **no** form removes the setting.

- *level*—Degree of sensitivity of information: **reserved4**, **TopSecret**, **Secret**, **Confidential**, **Reserved3**, **Reserved2**, **Unclassified**, or **Reserved1**.
- *authority*—Organization that defines the set of security levels that will be used in a network: **Genser**, **Sio-Esi**, **SCI**, or **NSA**.

For example:

```
ip security implicit-labelling confidential Genser
```

ip security multilevel *level1* [*authority...*] **to** *level2 authority2* [*authority3...*]

Sets the requested range of classification and authority on the interface. Traffic entering or leaving the system must have a security option that belongs in the specified range. The **no** form removes the setting.

- *level*—Degree of sensitivity: **reserved4**, **TopSecret**, **Secret**, **Confidential**, **Reserved3**, **Reserved2**, **Unclassified**, or **Reserved1**.
- *authority*—Organization that defines the set of security levels that will be used in a network: **Genser**, **Sio-Esi**, **SCI**, or **NSA**.

For example:

```
ip security multilevel Confidential Genser to TopSecret Genser
```

[**no**] **ip security strip**

Removes any basic security option on all datagrams leaving the router on the specified interface. The **no** form disables the function.

[**no**] **ip split-horizon**

Enables or disables the split horizon mechanism. The default for interfaces without Frame Relay or SMDS encapsulation is enabled. The default for all other interfaces is disabled.

[**no**] **ip tcp compression-connections** *number*

Sets the maximum number of connections per interface that the compression cache can support. Default is 16.

- *number*—Number of connections from 3 through 256.

For example:

```
ip tcp compression-connections 256
```

[**no**] **ip tcp header-compression** [**passive**]

Enables TCP header compression. The **no** form disables the compression. Default is disabled.

- **passive**—Sets the interface to compress outgoing traffic on the interface only when incoming traffic is compressed.

For example:

```
ip tcp header-compression passive
```

[**no**] **ip unnumbered** *interface-name*

Enables or disables IP processing on a serial interface, but does not assign an explicit IP address to the interface.

- *interface-name*—Name of another interface on which the router has assigned an IP address. Do not use this interface or another unnumbered interface.

For example:

```
ip unnumbered ethernet 0
```

[**no**] **ip unreachables**

Enables or disables the ability to send ICMP unreachable messages on an interface. Default is enabled.

transmit-interface *interface-name*

Assigns a transmit interface to a receive-only interface.

- *interface-name*—Name of the interface to which you want to convert the interface designated as the source of the route.

For example:

```
transmit-interface ethernet 0
```

IP Line Subcommand

[**no**] **access-class** *list* {**in** | **out**}

Restricts incoming and outgoing connections between a particular virtual terminal line and the addresses in an access list.

- *list*—An integer from 1 through 99 that identifies a specific access list of Internet addresses.
- **in** or **out**—Use the keyword **in** to restrict incoming connections; use the keyword **out** to restrict outgoing Telnet connections.

For example:

```
access class 23 in
```

Serial Line IP (SLIP) EXEC Command

slip {**default** | *address*}

Begins a SLIP connection on the auxiliary (AUX) line.

- **default**—Connect using assigned default address.
- *address*—Connect using a specific address.

For example:

```
Router> slip 131.108.2.5
Router> slip default
```

Serial Line IP (SLIP) Line Subcommands

no slip

Cancels SLIP support on the line.

slip access-class *number* {**in** | **out**}

Configures an access list to be used on packets to or from the SLIP host.

- *number*—IP access list number.
- **in**—Configures list for packets from the SLIP host.
- **out**—Transmits only those packets permitted by the access list.

For example:

```
slip access-class 3 in
```

slip address dynamic [*IP-address*]

When issued without an IP address, allows the IP address associated with a SLIP line to be assigned upon access. This feature is supported when a TACACS server is used. When issued with an IP address (*IP-address*), allows a default address to be specified upon access.

For example:

```
slip address dynamic 124.201.14.3
```

slip address *IP-address*

Specifies the Internet address assigned to the SLIP client at the other end of the serial line connection.

- *IP-address*—Internet address. Must be on the same network or subnet as the router's network interface.

For example:

```
slip address 128.73.98.2
```

slip dedicated

Places the line in SLIP mode permanently. The router does not create an EXEC on this line, so the line is not available for normal interactive use.

slip hold-queue *packets*

Specifies the limit of the SLIP output queue, which stores packets received from the network waiting to be sent to the SLIP client. Default is 2.

- *packets*—Maximum number of packets.

For example:

```
slip hold-queue 4
```

slip interactive

Allows the line to be used in either SLIP mode or interactive mode. Interactive mode is restored when the modem is disconnected or the line is cleared.

slip mtu *bytes*

Specifies the size of the largest Internet packet that the SLIP support can handle. Default is 1500 bytes.

- *bytes*—Maximum number of bytes.

For example:

```
slip mtu 3000
```

speed *baud*

Sets the transmit and receive speeds for the line.

- *baud*—100, 1200, 2400, 4800, 9600, 19200, or 38400.

For example:

```
speed 9600
```

IP Routing Protocol Global Configuration Commands

[**no**] **autonomous-system** *local-AS*

Specifies an autonomous system (AS) number. The **no** form removes the AS number.

- *local-AS*—Local autonomous system number to which the router belongs.

For example:

```
ip as-path access-list 4 permit ^109
```

[**no**] **ip default-network** *network-number*

Instructs a smart router to generate dynamic default information and pass it to other routers. The **no** form removes the instruction.

- *network-number*—Network number.

For example:

```
ip default-network 128.99.0.0
```

[**no**] **ip route** *network-address*

Establishes static routes.

- *network-address*—Network address for which you are establishing a static route.

For example:

```
ip route 131.161.7.12
```

[**no**] **ip route** *IP-address mask* {*IP-address* | *interface*} [*distance*]

Allows a static route to be overridden by dynamic routing information.

- *IP-address*—Network address; specify target network address first, then neighbor network address.
- *mask*—Network mask.
- *interface*—Interface name.
- *distance*—Administrative distance.

For example:

```
ip route 131.161.7.12 255.0.0.0 131.108.3.4 110
```

[**no**] **router** *protocol* [*autonomous-system*]

Selects the IP routing process. Must be entered before the router subcommands that further define and tune the routing process.

- *protocol*—Protocol-type keyword: **rip** or **igrp**.
- *autonomous-system*—For IGRP or OSPF protocols only: the number of an autonomous system.

For example:

```
router igrp 120
```

[**no**] **router ospf** *ospf-process-id*

Enables OSPF for the router. You can specify multiple OSPF routing processes in each router.

- *ospf-process-id*—An internally used identification parameter expressed as a positive integer.

For example:

```
router ospf 109
```

IP Routing Protocol Interface Subcommands

[**no**] **ip gdp**

Enables or disables GDP routing with all default parameters.

[**no**] **ip gdp holdtime** *seconds*

Enables or disables GDP routing, keeping priority and reporting interval at their default settings.

- *seconds*—Holdtime in seconds.

For example:

```
ip gdp holdtime 20
```

[**no**] **ip gdp priority** *number*

Enables or disables GDP routing, maintaining report time at 5 seconds and holdtime at 15 seconds for Ethernet networks.

- *number*—Priority number.

For example:

```
ip gdp priority 95
```

[**no**] **ip gdp reporttime** *seconds*

Enables or disables GDP routing maintaining a priority of 100 and hold time of 15 seconds.

- *seconds*—Report time.

For example:

```
ip gdp reporttime 10
```

[**no**] **ip irdp**

Enables or disables ICMP Router Discovery Protocol (IRDP) processing on an interface. Default is disabled. When enabled, default values are used. Table 4-9 lists the default values.

Table 4-9 ICMP Router Discovery Protocol Default Function and Values

Function	Default Value
router preference	100 (range 0–255)
maximum interval between advertisements	600 seconds
minimum interval between advertisements	400 seconds

You can change these values using the **ip irdp preference**, **ip irdp maxadvertinterval**, and **ip irdp minadvertinterval** commands.

[**no**] **ip irdp address** *IP-address* [*number*]

Specifies an address to proxy-advertise and its preference value when IRDP processing is enabled.

- *IP-address*—IP address to proxy-advertise.
- *number*—Preference value to assign to the address.

For example:

```
ip irdp address 131.108.14.6 50
```

[**no**] **ip irdp holdtime** *seconds*

Determines how long the advertisements are valid when IRDP processing is enabled.

- *seconds*—Valid time in seconds.

For example:

```
ip irdp holdtime 6000
```

[**no**] **ip irdp maxadvertinterval** *seconds*

Changes the default maximum interval between advertisements when IRDP processing is enabled. Default is 600.

- *seconds*—Interval in seconds.

For example:

```
ip irdp maxadvertinterval 400
```

[**no**] **ip irdp minadvertinterval** *seconds*

Changes the default minimum interval between advertisements when IRDP processing is enabled. Default is 400. If you change the maximum interval between advertisements, this value defaults to two-thirds of the new value.

- *seconds*—Interval in seconds.

For example:

```
ip irdp minadvertinterval 100
```

[**no**] **ip irdp preference** *number*

Changes the default router preference level when IRDP processing is enabled. A lower value increases the preference level. Default is 100.

- *number*—Number designating the value in the range 0 through 255.

For example:

```
ip irdp preference 50
```

[**no**] **ip ospf authentication-key** *8-bytes-of-password*

Assigns or cancels a password to be used by neighboring routers on a wire that employs OSPF's simple password authentication.

- *8-bytes-of-password*—Password you enter from the keyboard for authentication. It can be up to 8 bytes in length.

For example:

```
ip ospf authentication-key yourpassword
```

[**no**] **ip ospf cost** *cost*

Specifies or removes the cost of sending a packet on an interface.

- *cost*—Link state metric advertised as the link cost in the router's router links advertisement. The software does not support Type of Service (TOS), so you can assign only one cost per interface.

  In general, the path cost is calculated as follows:

$$\frac{10^8}{Bandwidth}$$

Table 4-10 lists the media types supported and their default costs.

Table 4-10 Media Types and Default Costs

Media	Default Cost
56-kbps serial link	1785
64-kbps serial link	1562
T1 (1.544-Mbps serial link)	65
E1 (2.048-Mbps serial link)	48
4-Mbps Token Ring	25
Ethernet (10 Mbps)	10
16-Mbps Token Ring	6

[**no**] **ip ospf dead-interval** *number-of-seconds*

Sets or cancels the number of seconds that neighboring routers wait after seeing this router's Hello packets before declaring the router down. This value is advertised in the router's Hello packets in the *DeadInt* field and must be the same for all routers attached to a common network. Default is four times the Hello interval.

- *number-of-seconds*—Unsigned integer value.

For example:

```
is ospf dead-interval 60
```

[**no**] **ip ospf hello-interval** *number-of-seconds*

Sets or cancels the number of seconds between the Hello packets that the router sends on the interface. This value is advertised in the router's Hello packets and must be the same for all routers attached to a common network.

- *number-of-seconds*—Unsigned integer value.

For example:

```
is ospf hello-interval 15
```

[**no**] **ip ospf priority** *8-bit-number*

Establishes or cancels a Router Priority, which helps determine the Designated Router for a network. Default is 0.

- *8-bit-number*—8-bit unsigned integer.

For example:

```
ip ospf priority 4
```

[**no**] **ip ospf retransmit-interval** *number-of-seconds*

Sets the number of seconds between link state advertisement retransmissions for adjacencies belonging to the interface. Default is 5 seconds.

- *number-of-seconds*—Number of seconds. Should be greater than the expected round-trip delay between any two routers on the attached network. The value should be larger for serial lines and virtual links.

For example:

```
ip ospf retransmit-interval 7
```

[**no**] **ip ospf transmit-delay** *number-of-seconds*

Sets or cancels the estimated number of seconds it takes to transmit a link state update packet on the interface. The value should include the transmission and propagation delays for the interface. Default is 1 second.

- *number-of-seconds*—Number of seconds; an integer.

For example:

```
ip ospf transmit-delay 2
```

[**no**] **ip route** *network-address*

Establishes static routes.

- *network-address*—Network address for which you are establishing a static route.

For example:

```
ip route 131.161.7.12
```

IP Routing Protocol Router Subcommands

[**no**] **area** *area-id* **authentication**

Enables authentication for an area; for OSPF only. The authentication type (AuType0 or AuType1) must be the same for all routers in an area.

- *area-id*—The Area ID of the area for which authentication is to be enabled.

For example:

```
area 12 authentication
```

[**no**] **area** *area-id* **stub** [**no**] **area** *area-id* **default-cost** *cost*

The two commands define an area as a stub area; for OSPF only. This command is used only on an area border router attached to a stub.

- *area-id*—The Area ID for the stub area specified as either a decimal value or an IP address.
- *cost*—Cost for the default external route used for the stub area expressed as a 32-bit number.

For example:

```
area 12 stub
area 12 default-cost 1001
```

[**no**] **area** *area-id* **range** *IP-address mask*

Advertises a single summary route to other areas; for OSPF only. This command is used only with area border routers.

- *area-id*—Area ID for the area about which routes are to be summarized specified as either a decimal value or an IP address.
- *IP-address*—Standard IP address.
- *mask*—Standard IP mask.

For example:

```
area 9 range 131.120.18.0 255.255.0.0
```

[**no**] **area** *area-id* **virtual-link** *router-id* [**hello-interval** *number-of-seconds*] [**retransmit-interval** *number-of-seconds*] [**transmit-delay** *number-of-seconds*] [**dead-interval** *number-of-seconds*] [**authentication-key** *8-bytes-of-password*]

Defines virtual links; for OSPF only.

- *area-id*—Area ID assigned to the transit area for the virtual link.

- *router-id*—Router ID associated with the virtual link neighbor.
- *number-of-seconds*—Number of seconds between the Hello packets that the router sends on the interface expressed as an unsigned integer. This value must be the same for all routers attached to a common network. Default is 10 seconds.
- *8-bytes-of-password*—String of characters that you can enter from the keyboard up to 8 bytes in length.

[**no**] **default-information allowed** {**in** | **out**}

Controls the handling of default information between multiple IGRP processes. Default is enabled.

- **in** or **out**—Use the **in** keyword with the **no** form to suppress IGRP exterior or default routes when received by an IGRP process. Use the **out** keyword with the **no** form to suppress IGRP exterior routes in updates.

For example:

```
no default-information allowed out
```

[**no**] **default-information originate metric** *metric-value* **metric-type** *type-value*

Enables or disables the generation of a default route into an OSPF domain. Must be used with a **redistribute** command.

- **metric** *metric-value*—Specifies the link state cost to be assigned to the default route. The argument *metric-value* is a dimensionless link state cost formed as a 24-bit decimal.
- **metric-type** *type-value*—Specifies the external link type associated with the default route advertised into the OSPF routing domain. The *type-value* argument can be 1 (Type 1 external route) or 2 (Type 2 external route). Default is 2.

For example:

```
default-information originate metric 100 metric-type 1
```

default-metric *bandwidth delay reliability loading mtu*

Sets metrics for IGRP only.

- *bandwidth*—Minimum bandwidth of the route in kilobits per second.
- *delay*—Route delay in tens of microseconds.
- *reliability*—Likelihood of successful packet transmission expressed as a number between 0 and 255, where 255 is 100-percent reliability.
- *loading*—Effective bandwidth of the route in kilobits per second.
- *mtu*—Maximum transmission unit (MTU) of the route.

For example:

```
default-metric 10000 2000 254 1 1500
```

default-metric *number*

Sets metrics for RIP, which use scalar, single-valued metrics.

- *number*—Default metric value appropriate for the specified routing protocol expressed as an unsigned integer.

For example:

```
default-metric 10000
```

no default-metric

Instructs the current routing protocol to resume using the built-in automatic metric translations.

[**no**] **distance** *weight* [[*IP-source-address IP-address-mask*] [*access-list-number*]]

Defines or deletes an administrative distance.

- *weight*—Integer from 10 through 255 that specifies a default administrative distance that the router uses when no other specification exists for a routing information source.
- *IP-source-address*—Internet address that identifies a router, network, or subnet to which the weight value applies.
- *IP-address-mask*—A mask that specifies which bits, if any, to ignore in the address value in dotted-decimal format.
- *access-list-number*—Number of a standard IP access list.

For example:

```
distribute-list 1 in Ethernet 0
```

[**no**] **distribute-list** *access-list-number* **out** [*interface-name* | *routing-process*]

Suppresses networks so that they are not sent in updates.

- *access-list-number*—Standard IP access list number.
- *interface-name* or *routing-process*—To restrict the routing updates sent to a specific interface, specify the interface. To redistribute networks, specify the routing process name.

For example:

```
distribute-list 3 out igrp 109
```

[**no**] **metric holddown**

For IGRP only. Disables or re-enables holddown. Use this command only if the entire autonomous system (AS) is running Version 8.2(5) or later.

[**no**] **metric maximum-hops** *hops*

For IGRP only. Causes the IP routing software to advertise as unreachable those routes with a hop count greater than the assigned value.

- *hops*—Hop count from 1 through 255. Default is 100.

For example:

```
metric maximum-hops 150
```

[**no**] **metric weights** *TOS K1 K2 K3 K4 K5*

Allows the tuning of the IGRP metric calculation for a particular Type of Service (TOS).

- *TOS*—Use the parameter 0.
- *K1–K5*—Constants for the equation that converts an IGRP metric vector into a scalar quantity. By default, K1 = 1, K2 = 0, K3 = 1, K4 = 0, and K5 = 0.

For example:

```
neighbor any 2
neighbor any third-party 10.1.1.1
```

Caution Enabling the **metric weights** command can adversely affect system operation in a mixed router-vendor environment.

[**no**] **neighbor** *IP-address*

Creates a list of neighbor routers. The **no** form removes the entry.

- *IP-address*—IP address of a peer router with which routing information will be exchanged.

For example:

```
neighbor 120.23.4.1 filter-as 20 permit 60
```

[**no**] **neighbor** *IP-address* **interface** *interface* [**priority** *8-bit-number*] [**poll-interval** *number-of-seconds*]

Configures routers interconnecting to nonbroadcast networks; for OSPF only. The **no** form removes the neighbor with the specified IP address from the list.

- *IP-address*—Neighbor's IP address.
- **interface** *interface*—Specifies interface type and unit number.
- **priority** *8-bit-number*—Router Priority value of the nonbroadcast neighbor associated with the specified IP address.
- **poll-interval** *number-of-seconds*—Specifies the interval at which hello packets are sent to a neighboring router that has become inactive. This interval should be much larger then the Hello Interval. Default is 120 seconds.

For example:

```
neighbor 131.104.27.2 version 2
```

[**no**] **neighbor** *IP-address* **weight** *weight*

Specifies a weight to assign to all routes learned from this neighbor. The router chooses as the preferred route the route with the highest weight.

- *IP-address*—Specific neighbor connection to which you want to assign the *weight*.
- *weight*—Weight to assign.

[**no**] **network** *IP-address*

For IGRP and RIP, it specifies the interface on which to run the protocol and the networks to advertise. The no form removes an entry from the list.

- *IP-address*—IP address

For example:

```
network 129.140.0.0
```

[**no**] **network** *IP-address wildcard-mask* **area** *area-id*

Specifies a range of IP addresses for any area in which OSPF is used as a routing protocol.

- *IP-address*—IP address.
- *wildcard-mask*—An IP-address-type mask that includes “don’t care” bits.
- *area-id*—An area to be associated with the OSPF address range specified as either a decimal value or an IP address.

For example:

```
network 192.31.7.0 backdoor
```

[**no**] **offset-list** *list* {**in** | **out**} *offset*

For IGRP and RIP only. Adds or removes a positive offset to incoming and outgoing metrics for networks matching an access list.

- *list*—Access list. Specify 0 to apply the offset to all metrics.
- **in** or **out**—Indicate whether the offset applies to incoming (**in**) or outgoing (**out**) metrics.
- *offset*—Offset. For IGRP, the offset is added to the delay component only.

For example:

```
offset-list 121 out 110
```

[**no**] **passive-interface** *interface*

Disables or enables the routing of updates on an interface.

- *interface*—Interface name.

For example:

```
passive-interface serial 1
```

[**no**] **redistribute** *process-name* [*AS-number*]

Passes routing information among routing protocols.

- *process-name*—Routing information source: **static**, **rip**, or **igrp**.
- *AS-number*—If you specified **igrp**, supply the autonomous system number.

For example:

```
redistribute igrp 4
redistribute static
```

[**no**] **redistribute** *protocol* [*source-id*] [**metric** *metric-value*] [**metric-type** *type-value*] [**tag** *tag-value*] [**subnets**]

Redistributes routes from other OSPF routing domains and non-OSPF routing domains into a specific OSPF routing domain.

- *protocol*—Source protocol from which routes are being distributed: **igrp**, **ospf**, **rip**, or **static**.
- *source-id*—Autonomous system (IGRP) or an OSPF process ID from which routes are to be redistributed. Do not include this argument if you used the keyword **rip**.
- **metric** *metric-value*—Specifies the link state cost to be assigned to the default route. The argument *metric-value* is a dimensionless link state cost formed as a 24-bit decimal.
- **metric-type** *type-value*—Specifies the external link type associated with the default route advertised into the OSPF routing domain. The *type-value* argument can be 1 (Type 1 external route) or 2 (Type 2 external route). Default is 2.
- **tag** *tag-value*—32-bit decimal value attached to each external route.
- **subnets**—Specifies the scope of redistribution for the specified protocol.

[**no**] **timers basic** *update invalid holddown flush sleeptime*

Adjusts timers. Use the **show ip protocols** command to display defaults and current values. The **no** form restores the default.

- *update*—Rate at which updates are sent.
- *invalid*—Number of seconds after which a route is declared invalid. The value of *invalid* should be three times the value of *update*.
- *holddown*—Number of seconds during which routing information regarding better paths is suppressed. The value of *holddown* should be at least three times the value of *update*.
- *flush*—Number of seconds that must pass before the route is removed from the routing table. The value of *flush* should be equal to or greater than the sum of the values of *invalid* and *holddown*.
- *sleeptime*—Number of milliseconds to postpone routing updates.

Caution The **timers basic** commands should be used only if all the routers in a network are from the same vendor. Their use in a mixed router-vendor environment can adversely affect system operation.

IP and SLIP Show Commands

Table 4-11 lists the IP and SLIP **show** commands.

Table 4-11 IP and SLIP Show Commands

Command	Display
show access-lists	Contents of IP access lists.
show async-bootp	Parameters that have been set for SLIP extended BootP requests.
show hosts	Default domain name, style of name lookup service, list of name server hosts, and cached list of host names and addresses.
show ip accounting [*checkpoint*]	Active IP accounting database.

Command	Display
show ip aliases	Internet addresses mapped to TCP ports and SLIP addresses that are treated like aliases.
show ip arp	Address Resolution Protocol (ARP) cache.
show ip cache	Routing table cache used to fast switch Internet traffic.
show ip interface [*interface*]	IP parameters configured on the interface.
show ip irdp	IRDP values.
show ip masks [*address*]	Masks used for network addresses.
show ip ospf [*options*]	OSPF routing processes.
show ip ospf interface [*interface*]	OSPF parameters configured on the interface.
show ip ospf neighbor [*interface*]	OSPF neighbor information on a per-interface basis.
show ip protocols	Parameters and current state of the active routing protocol process.
show ip route [*options*]	IP routing table.
show ip tcp header-compression	IP compression statistics.
show ip traffic	IP protocol statistics.
show slip	Status of all lines configured for SLIP.
show tcp [*line-number*]	Status of TCP connections.

Novell Global Commands

[**no**] **access-list** *number* {**deny** | **permit**} *novell-source-network* [.*source-address* [*source-mask*]] *novell-destination-network* [.*destination-address* [*destination-mask*]]

Specifies standard Novell IPX access lists. The **no** form removes any access list in the current image with the specified number.

- *number*—A unique number for this access list from 800 through 899.
- **deny** or **permit**—Specifies the deny or permit condition.
- *novell-source-network*—Source network.
- .*source-address*—Address of the source network.
- *source-mask*—Mask for the *source-address*.
- *novell-destination-network*—Destination network.
- .*destination-address*—Address of the destination network.
- *destination-mask*—Mask for the *destination-address*.

For example:

```
access list 800 deny -1 2
access list 800 deny 1.0000.0c00.1111
access-list 800 permit 1.1111.1111.1111
0000.0000.0000 2.2222.2222.2222 0000.0000.0000
```

[**no**] **access-list** *number* {**deny** | **permit**} *novell-protocol source-network* [.*source-address* [*source-mask*]] *source-socket destination-network* [.*destination-address* [*destination-mask*]] *destination-socket*

Specifies extended Novell IPX access lists. The **no** form removes any access list in the current image with the specified number.

- *number*—A unique number for this extended access list from 900 through 999.
- **deny** or **permit**—Specifies the deny or permit condition.
- *novell-protocol*—Novell protocol number.
- *source-network*—Source network.
- .*source-address*—Address of the source network. A network number of –1 matches all networks.
- *source-mask*—Mask for the *source-address*.
- *source-socket*—Socket number. A socket number of 0 matches all sockets.
- *destination-network*—Destination network.
- .*destination-address*—Address of the destination network.
- *destination-mask*—Mask for the *destination-address*.
- *destination-socket*—Destination socket number. A socket number of 0 matches all sockets.

For example:

```
access list 900 deny 1 1 1234 2 1234
access list 900 deny 1 1.1111.1111.1111 0000.0000.
0000 1234 2.2222.2222.2222 0000.0000.0000 1234
```

[**no**] **access-list** *number* {**permit** | **deny**} *network* [.*address*] [*service-type*]

Defines an access list for filtering SAP-based messages generated by Novell servers and our routers as they broadcast their capabilities.

- *number*—A unique decimal number from 1000 through 1099.
- **permit** or **deny**—Specifies the type of access desired. Permit or deny access is based on the data provided.
- *network*—A hexadecimal Novell network number. The value 0 defines the local network; the value -1 defines all networks.
- .*address*—Novell host address.
- *service-type*—The service type to filter in hexadecimal format. The value 0 represents all services.

For example:

```
access-list 1001 deny -1 4
access-list 1001 permit -1
```

[**no**] **novell maximum-paths** *paths*

Follows the **novell routing** command to set the maximum number of multiple paths that the router will remember and use. The **no** form restores the default, which is 1.

- *paths*—Number of paths to be remembered.

For example:

```
novell maximum-paths 3
```

[**no**] **novell route** *network network.address*

Specifies or removes static routes for a Novell network.

- *network*—The network whose messages you want to forward.
- *network.address*—The network address of the router to which you want to forward network traffic.

For example:

```
novell route 5e 3abc.0000.0c00.1ac9
```

[**no**] **novell routing** [*host-address*]

Enables or disables Novell routing and Novell RIP routing and SAP services.

- *host-address*—System-wide host address. If you do not specify an address, the MAC address of the first Ethernet or Token Ring interface is used. The address must not be multicast.

For example:

```
novell routing 0000.0c00.23fe
```

[**no**] **novell sap** *service-type name net.address socket hop-count*

Specifies or removes static Novell SAP table entries.

- *service-type*—SAP service-type number.
- *name*—Service name.
- *net.address*—Network and host address of the server.
- *socket*—Socket number for this service.
- *hop-count*—Server is this number of hops away.

For example:

```
novell sap 107 MAILSERV 160.0000.0c01.2b72 8104 1
```

Novell Interface Subcommands

[**no**] **novell access-group** *number*

Assigns a Novell IPX access list group number to a specific interface. The **no** form removes the number.

- *number*—Novell access list number. All outgoing packets forwarded through the interface will be filtered by this access list.

For example:

```
novell access-group 815
```

novell encapsulation {**novell-ether** | **arpa**}

Selects which data format or encapsulation is used on an Ethernet interface. Default is Novell IPX over Ethernet using Novell's variant of IEEE 802.2 encapsulation.

Choose one of these keywords:

- **novell-ether**—Enter to specify Novell IPX over Ethernet using Novell's variant of IEEE 802.2 encapsulation.
- **arpa**—Enter when the Novell systems must communicate with other vendors' systems such as DEC VAX/VMS. In this case, Ethernet-style encapsulation is used with a protocol type of 8137.

For example:

```
novell encapsulation arpa
```

[**no**] **novell helper-address** *net.host*

Forwards broadcast packets that match the access list specified by the **novell helper-list** subcommand. Useful for hosts that use a protocol other than SAP to advertise their availability.

- *net.host*—The network and host address to which broadcast packets are forwarded.

For example:

```
novell helper-address 3abc.0000.0c00.1ac9
```

[**no**] **novell helper-list** *access-list-number*

Forwards packets that pass the specified Novell access list to the Novell helper host. The **no** form disables the function.

- *access-list-number*—The access list number specified in the Novell **access-list** command.

For example:

```
novell helper-list 801
```

[**no**] **novell input-network-filter** *access-list-number*

Interface subcommand that explicitly specifies the networks that are added to the Novell IPX routing table. The **no** form disables the function.

- *access-list-number*—The access list number specified in the **novell access-list** command.

For example:

```
novell input-network-filter 801
```

[**no**] **novell input-sap-filter** *access-list-number*

Explicitly specifies the services that are added to the Novell SAP table. The **no** form disables this function.

- *access-list-number*—A SAP access list number from 1000 through 1099.

For example:

```
novell input-sap-filter 1000
```

[**no**] **novell network** *number*

Enables and disables Novell routing on a particular interface.

- *number*—Number of the Novell network to which the interface is attached.

For example:

```
novell network 5e
```

[**no**] **novell output-network-filter** *access-list-number*

Explicitly specifies the list of networks that are sent in routing updates. The **no** form disables the function.

- *access-list-number*—The access list number specified in the **novell access-list** command.

For example:

```
novell output-network-filter 821
```

[**no**] **novell output-sap-delay** *delay*

Establishes a delay between SAP packets so that the router interface operates at the slower speed of the Novell server. The **no** form disables the mechanism.

- *delay*—The delay between SAP packets in milliseconds.

For example:

```
novell output-sap-delay 200
```

[**no**] **novell output-sap-filter** *access-list-number*

Explicitly specifies the list of services that are included in a SAP update. The **no** form disables this function.

- *access-list-number*—A SAP access list number from 1000 through 1099.

For example:

```
novell input-sap-filter 1000
```

[**no**] **novell route-cache**

Enables or disables Novell fast switching. Default is enabled.

[**no**] **novell router-filter** *access-list-number*

Interface subcommand that specifies or removes the list of routers from which data will be accepted.

- *access-list-number*—Access list number specified in the **novell access-list** command.

For example:

```
novell router-filter 823
```

[**no**] **novell router-sap-filter** *access-list-number*

Configures the routers to filter Novell SAP messages. The **no** form removes the filters.

- *access-list-number*—A SAP Novell access list from 1000 through 1099. Defines the specific router from which SAP updates will be accepted or denied.

For example:

```
novell router-sap-filter 1000
```

novell sap-interval *interval*

Establishes less frequent SAP update interval for use over slow links. Default is 1 minute.

- *interval*—Number of minutes between SAP updates. If *interval* is 0, periodic updates are not sent. A message is sent only when the server first appears and when it goes down.

For example:

```
novell sap-interval 5
```

[**no**] **novell source-network-update**

When enabled, repairs corrupted network numbers by setting the source network field of any packet with a hop count of 0 to the local network number.

[**no**] **novell update-time** *seconds*

Allows the Novell routing update timers to be set individually for each interface. This command can be used only in a homogenous router environment, and all timers should be the same for routers connected to the same network segment. The **no** form restores the default of 60 seconds.

- *seconds*—The interval between updates. Minimum is 10.

For example:

```
novell update-time 40
```

Novell Show Commands

Table 4-12 lists the Novell **show** commands.

Table 4-12 Novell Show Commands

Command	Display
show novell cache	List of fast-switching cache entries.
show novell interface [*interface*]	Novell parameters configured on the interface.
show novell route	Novell routing table.
show novell servers	Servers discovered through SAP advertisements.
show novell traffic	Information about Novell packets transmitted and received including number and type.

Bridging Configuration

Bridging configuration includes the following sections:

- Transparent Bridging Global Configuration Commands

- Transparent Bridging Interface Subcommands

Transparent Bridging Global Configuration Commands

[**no**] **access-list** *list* {**permit** | **deny**} *address mask*

Prepares access control information for filtering of frames by canonical (Ethernet ordered) MAC address. The **no** form removes a single access list entry.

- *list*—An integer from 700 through 799 selected for the list.
- **permit** or **deny**—Indicates whether the frame is permitted or denied.
- *address*—48-bit canonical MAC address written in dotted triplet form.
- *mask*—48-bit canonical MAC address written in dotted triplet form. The ones bits in the m*ask* argument are the *address* bits to be ignored.

For example:

```
access-list 700 deny 0800.2000.0000 0000.00FF. FFFF
access-list 700 permit 0000.0000.0000 FFFF.FFFF. FFFF
```

[**no**] **access-list** *list* {**permit** | **deny**} *type-code wild-mask*

Prepares access control information for filtering frames by protocol type. The **no** form removes a single access list entry.

- *list*—Unique number from 200 through 299 that identifies the list.
- **permit** or **deny**—Indicates whether the frame is permitted or denied.
- *type-code*—16-bit hexadecimal number with a leading *0x*.
- *wild-mask*—16-bit hexadecimal number whose ones bits correspond to bits in the *type-code* argument that the router should ignore when making a comparison.

For example:

```
access-list 201 permit 0x6005 0x0000
access-list 201 deny 0x0000 0xFFFF
```

[**no**] **access-list** *list* {**permit** | **deny**} *source-addr source-mask dest dest-mask offset-into-packet size:1-4 operation operand*

Defines an extended access list for finer control of bridged traffic.

- *list*—An integer from 1100 through 1199.
- **permit** or **deny**—Indicates whether the frame is permitted or denied.
- *source-addr*—MAC Ethernet address in the form xxxx.xxxx.xxxx.
- *source-mask*—Mask of MAC Ethernet source address bits to be ignored.
- *dest*—MAC Ethernet values used for matching the destination address of a packet.
- *dest-mask*—Mask of MAC Ethernet destination address bits to be ignored.
- *offset-into-packet*—With the size argument, defines a range of values that must be satisfied in the access list. Specified in decimal or hexadecimal format in the form *0xnn*.

- *size*—An integer from 1 through 4.

- *operation*—The argument *operation* can be one of these keywords:

  lt—less than

  gt—greater than

  eq—equal

  neq—not equal

  and—bitwise and

  xor—bitwise exclusive or

- *operand*—The argument *operand* is a value to be compared to or masked against.

For example:

```
access-list 1102 permit 000c.1b00.0000 0000.00ff.
ffff 0000.0000.0000 ffff.ffff.ffff 0x1e 2 lt 0x55aa
```

[**no**] **bridge** *group* **acquire**

Enables or disables the dynamic learning process. Default is enabled.

- *group*—Spanning tree group number.

For example:

```
bridge 1 acquire
```

[**no**] **bridge** *group* **address** *MAC-address* [**forward** | **discard**] [*interface*]

Adds or removes an address from the forwarding database. The **no** form followed by the MAC address removes an address from the forwarding database.

- *group*—Spanning tree group number.
- *MAC-address*—48-bit dotted triplet canonical (Ethernet ordered) hardware address such as those displayed by the EXEC **show arp** command. The address can be a station address, the broadcast address, or a multicast destination address.
- **forward**—Enables the bridge to forward a frame sent from or destined for the specified address.
- **discard**—Instructs the bridge to discard frames sent from or destined for the specified address without further processing.
- *interface*—Specifies an interface on which the address can be reached.

For example:

```
bridge 1 address 0800.cb00.45e9 forward ethernet 1
```

[**no**] **bridge** *group* **domain** *domain-number*

Enables or disables multiple domain spanning trees. Only those devices in the domain can share spanning tree information. This command works only when the bridge group is running the IEEE spanning tree protocol. Other suppliers' bridges might not work correctly on networks containing our bridges' domain numbers other than 0.

- *group*—Bridge group number between 0 and 10 as specified by the **bridge** *group* **protocol ieee** command.

- *domain-number*—Unique domain number that you choose. The domain number 0 is required for communicating with IEEE bridges that do not support this domain extension. Default is 0.

For example:

```
bridge 1 domain 3
```

bridge *group* **forward-time** *seconds*

Sets the default of the forward delay interval; that is, the amount of time the bridge listens for topology change information after an interface has been activated for bridging and before forwarding actually begins. Default is 30 seconds.

- *group*—Spanning tree group number.
- *seconds*—The forward delay interval from 10 through 200 seconds.

For example:

```
bridge 1 forward-time 60
```

bridge *group* **hello-time** *seconds*

Specifies the interval between Bridge Protocol Data Units (BPDUs). Default is 1 second.

- *group*—Spanning tree group number.
- *seconds*—Time interval, from 1 through 10 seconds.

For example:

```
bridge 2 hello-time 5
```

[**no**] **bridge** *group* **lat-service-filtering**

Enables or disables LAT service filtering. The **no** form restores the default, which is disabled.

- *group*—Bridge group.

bridge *group* **max-age** *seconds*

Specifies the interval that the bridge waits to hear BPDUs from the root bridge before recomputing the bridge spanning tree topology. Default is 15 seconds.

- *group*—Spanning tree group number.
- *seconds*—Interval that the bridge will wait to hear BPDUs from the root bridge.

For example:

```
bridge 2 max-age 20
```

[**no**] **bridge** *group* **multicast-source**

Allows or disallows the forwarding of frames with multicast source addresses. This command does not affect the learning of frames.

- *group*—Spanning tree group number.

For example:

```
bridge 2 multicast-source
```

bridge *group* **priority** *number*

Sets the priority of an individual bridge for selection as the root bridge. A lower number increases the likelihood for selection. Minimum = 1, maximum = 65000, default = 128.

- *group*—Spanning tree group number.
- *number*—Priority number from 1 through 65000.

For example:

```
bridge 2 priority 1000
```

[**no**] **bridge** *group* **protocol** {**ieee**}

Defines or removes a spanning tree protocol and spanning tree group.

- g*roup*—Spanning tree group number from 1 through 9.
- **ieee**—The protocol to use.

For example:

```
bridge 9 protocol ieee
```

Transparent Bridging Interface Subcommands

[**no**] **bridge-group** *group*

Assigns the network interface to the spanning tree group. The **no** form removes the network interface.

- *group*—Spanning tree group number.

For example:

```
bridge-group 2
```

[**no**] **bridge-group** *group*

Assigns each network interface to a spanning-tree group.

- *group*—Spanning tree group number.

bridge-group *group* **circuit** *number*

Establishes load balancing, marking a serial interface as belonging to circuit group number. Parallel serial interfaces on both bridges all must be flagged as being members of the same circuit group.

- *group*—Spanning tree group number.
- *number*—Circuit group number expressed as an integer from 1 through 9.

For example:

```
bridge-group 3 circuit 1
```

[**no**] **bridge-group** *group* **input-address-list** *list*

Assigns or removes an access list to or from a particular interface for filtering by the MAC source addresses.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 299 assigned with the bridge **access-list** command.

For example:

```
bridge-group 1 input-address-list 200
```

[**no**] **bridge-group** *group* **input-lat-service-deny** *grouplist*

Specifies the group codes with which to deny access upon input. Default is no filtering.

- *group*—Spanning tree group number.
- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

For example:

```
bridge-group 1 input-lat-service-deny 1 5 12-14
```

[**no**] **bridge-group** *group* **input-lat-service-permit** *grouplist*

Specifies the group codes with which to permit access upon input. Default is no filtering.

- *group*—Spanning tree group number.
- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

For example:

```
bridge-group 1 input-lat-service-permit 1 5 12-14
```

bridge-group *group* **input-lsap-list** *list*

Adds or removes a filter for IEEE 802-encapsulated packets on input. This access list is applied to all IEEE 802 frames received on that interface prior to the bridge-learning process.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 299 assigned with the bridge **access-list** command.

For example:

```
bridge-group 2 input-lsap-list 250
```

bridge-group *group* **input-type-list** *list*

Adds or removes a filter for Ethernet- and SNAP-encapsulated packets on input. The bridge applies the access list to all Ethernet frames received on that interface prior to the bridge learning process.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 299 assigned with the bridge **access-list** command.

For example:

```
bridge-group 4 input-type-list 200
```

[**no**] **bridge-group** *group* **lat-compression**

Reduces the amount of bandwidth that LAT traffic consumes on serial interfaces. LAT compression can be specified for serial compression only.

- *group*—Spanning tree group number.

For example:

```
bridge-group 2 lat-compression
```

[**no**] **bridge-group** *group* **output-address-list** *list*

Assigns or removes an access list to or from a particular interface for filtering by the MAC destination addresses.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 299 assigned with the bridge **access-list** command.

For example:

```
bridge-group output-address-list 204
```

bridge-group *group* **output-lat-service-deny** *grouplist*

Specifies the group codes with which to deny access upon output. Default is no filtering.

- *group*—Spanning tree group number.
- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

For example:

```
bridge-group 1 output-lat-service-deny 1 5 12-14
```

bridge-group *group* **output-lat-service-permit** *grouplist*

Specifies the group codes with which to permit access upon output. Default is no filtering.

- *group*—Spanning tree group number.
- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

For example:

```
bridge-group 1 output-lat-service-permit 1 5 12-14
```

bridge-group *group* **output-lsap-list** *list*

Adds or removes a filter for IEEE 802-encapsulated packets on output. This access list is applied just before sending out a frame to an interface.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 299 assigned with the bridge **access-list** command.

For example:

```
bridge-group 3 output-lsap-list 223
```

bridge-group *group* **output-type-list** *list*

Adds or removes a filter for Ethernet- and SNAP-encapsulated packets on output. The bridge applies the access list just before sending out a frame to an interface.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 299 assigned with the bridge **access-list** command.

For example:

```
bridge-group 5 output-type-list 299
```

[**no**] **bridge-group** *group* **path-cost** *cost*

Sets or removes a different path cost. Default is 100.

- *group*—Spanning tree group number.
- *cost*—Integer from 0 through 65535. Higher values indicate higher costs.

For example:

```
bridge-group 2 path-cost 20
```

bridge-group *group* **priority** *number*

Assigns a priority to an interface. This priority is used in tie-breaking when computing a network topology. Default is 0.

- *group*—Spanning tree group number.
- *number*—Priority value expressed as an integer from 0 through 255. The lower the number, the more likely it is that the bridge on this interface will be chosen as the root.

For example:

```
bridge-group 1 priority 10
```

[**no**] **ethernet-transit-oui** [**90-compatible** | **standard** | **cisco**]

Chooses the OUI Code to be used in the encapsulation of Ethernet Type II frames across Token Ring backbone networks.

Transparent Bridging Show Commands

Table 4-13 lists the transparent bridging **show** commands.

Table 4-13 Transparent Bridging Show Commands

Command	Display
show bridge [*options*]	Classes of entries in the bridge-forwarding database.
show span	Current, known spanning-tree topology, including whether or not LAT group code filtering is in effect.

IBM Connectivity

IBM connectivity features are described in the following sections:

- LLC2 Interface Subcommands
- Source-Route Bridging Global Configuration Commands
- Source-Route Bridging Interface Subcommands

LLC2 Interface Subcommands

llc2 ack-delay-time *milliseconds*

Controls the maximum amount of time that the router allows incoming I-frames to stay unacknowledged. Minimum = 1, maximum = 60000, default = 3200.

- *milliseconds*—Number of milliseconds that the router allows incoming I-frames to stay unacknowledged, even if it has not received the number of frames specified with the **llc2 ack-max** command.

For example:

```
llc2 ack-delay-time 800
```

llc2 ack-max *packet-count*

Controls the maximum number of information frames (I-frames) received by the router before it must send an acknowledgment to these frames. Minimum = 1, maximum = 255, default = 3.

- *packet-count*—The number of frames.

For example:

```
llc2 ack-max 5
```

llc2 idle-time *milliseconds*

Controls the frequency of polls during periods of idle traffic. Minimum = 1, maximum = 60000, default = 10000.

- *milliseconds*—The number of milliseconds that pass when there is no traffic before the LLC2 station sends a Receiver Ready frame.

For example:

```
llc2 idle-time 1500
```

llc2 local-window *packet-count*

Controls the maximum number of information frames sent by the router before it waits for an acknowledgment to these frames. Minimum = 1, maximum = 127, default = 7.

- *packet-count*—Maximum number of I-frames that can be sent before the router must wait for an acknowledgment.

For example:

```
llc2 local-window 5
```

llc2 n2 *retry-count*

Controls the number of times the router retries operations such as sending an unacknowledged frame or polling a remote busy station. Minimum = 1, maximum = 255, default = 8.

- *retry-count*—Number of times router should retry various operations.

For example:

```
llc2 n2 5
```

llc2 t1-time *milliseconds*

Controls how long the router waits for an acknowledgment to transmitted I-frames. Minimum = 1, maximum = 60000, default = 1000.

- *milliseconds*—Maximum number of milliseconds the T1 timer should wait for an acknowledgment from the receiver that an I-frame has been received.

For example:

```
llc2 t1-time 10000
```

llc2 tbusy-time *milliseconds*

Controls the amount of time that the router waits while the other LLC2 station is in a busy state before attempting to poll the remote station again. Minimum = 1, maximum = 60000, default = 9600.

- *milliseconds*—Number of milliseconds that the router waits.

For example:

```
llc2 tbusy-time 10000
```

llc2 tpf-time *milliseconds*

Controls the amount of time the router waits for a final response to a poll frame that it sent before the router resends the original poll frame. Minimum = 1, maximum = 60000, default = 1000.

- *milliseconds*—Number of milliseconds that the router waits.

For example:

```
llc2 tpf-time 10000
```

llc2 trej-time *milliseconds*

Controls the amount of time the router waits for a resend of a rejected frame before sending the reject (REJ) command to the remote station. Minimum = 1, maximum = 60000, default = 3200.

- *milliseconds*—Number of milliseconds that the router waits.

For example:

```
llc2 trej-time 30000
```

llc2 xid-neg-val-time *milliseconds*

Controls the frequency of exchange of identification (XID) frame transmissions by the router. It is recommended that you do not change this parameter unless asked to by technical personnel. Minimum = 1, maximum = 60000, default = 0.

- *milliseconds*—Number of milliseconds after which the router transfers XID frames to other LLC2-speaking stations.

For example:

```
llc2 xid-neg-val-time 10
```

llc2 xid-retry-time *milliseconds*

Controls how long the router waits for a reply to the exchange of identification (XID) frames that it sends to remote stations. Minimum = 1, maximum = 60000, default = 60000.

- *milliseconds*—Maximum number of milliseconds that the router should wait. The value for this command should be larger than the value in the **t1-time** command.

For example:

```
llc2 xid-retry-time 10000
```

LLC2 Show Command

Table 4-14 LLC2 Show Command

Command	Display
show llc2	State of the LLC2 connections.

Source-Route Bridging Global Configuration Commands

[**no**] **access-list** *list* {**permit** | **deny**} *type-code wild-mask*

Configures the access list mechanism for filtering frames by protocol type.

- *list*—Access list number.
- **permit** or **deny**—Specify **permit** to permit the frame; specify **deny** to deny the frame.
- *type-code*—LSAP type code for 802-encapsulated packets or SNAP type code for SNAP-encapsulated packets. 16-bit hexadecimal number.
- *wild-mask*—16-bit hexadecimal number whose ones bits correspond to the bits in the type-code, indicating that the router should ignore these bits when making a comparison.

For example:

```
access-list 201 permit 0xE0E0 0x0101
```

[**no**] **lnm snmp-only**

Prevents any LNM stations from modifying parameters in the router. The **no** form allows modifications.

[**no**] **locaddr-priority-list** *list address-number queue-keyword*

Establishes queuing priorities based on the address of the logical unit (LU).

- *list*—An arbitrary integer between 1 and 10 that identifies the LU address priority list selected by the user.
- *address-number*—Value of the LOCADDR = parameter on the LU macro; this is a 1-byte address of the LU in hex.
- *queue-keyword*—A priority queue name; one of **high**, **medium**, **normal**, or **low**.

For example:

```
locaddr-priority-list 1 02 high
```

[**no**] **netbios access-list bytes** *name* {**permit** | **deny**} *offset pattern*

Defines the offset and patterns with which to match byte offsets in NetBIOS packets.

- *name*—Name of the access list being defined.
- **permit** or **deny**—Specifies the permit or deny condition.
- *offset*—Decimal number indicating the number of bytes into the packet where the byte comparison should begin. An offset of 0 points to the beginning of the NetBIOS delimiter string (0xffef) at the start of each NetBIOS packet.
- *pattern*—Hexadecimal string of digits representing a byte pattern.

For example:

```
netbios access-list bytes marketing permit 3 0xabcd
```

[**no**] **netbios access-list host** *name* {**permit** | **deny**} *pattern*

Assigns the name of the access list to a station or set of stations on the network. The **no** form removes an entire list or the entry specified with the *pattern* argument.

- *name*—Name of the access list being defined.
- **permit** or **deny**—Specifies the permit or deny condition.
- *pattern*—Set of characters representing the name of the station, or a combination of characters and pattern matching symbols that establish a pattern for a set of NetBIOS station names.

For example:

```
netbios access-list host marketing permit ABCD
```

[**no**] **netbios name-cache** *mac-address netbios-name interface-name*
[**no**] **netbios name-cache** *mac-address netbios-name* **ring-group** *number*
[**no**] **netbios name-cache** *mac-address netbios-name*

Defines a static NetBIOS name cache entry. The **no** form removes the entry.

- *netbios-name*—Server name linked to the *MAC address.*
- *mac-address*—MAC address.
- *interface-name*—Specifies that the link is accessible locally.
- **ring-group** *number*—Specifies that the link is accessible remotely.

For example:

```
netbios name-cache 0110.2222.3333 DEF ring-group 2
```

[**no**] **netbios name-cache query-timeout** *seconds*

Specifies the dead time for NetBIOS name caching that starts when a host sends any ADD_NAME_QUERY, ADD_GROUP_NAME, or STATUS_QUERY frame. The router drops any repeat or duplicate frame sent by the same host during this time period. The **no** form restores the default of 6 seconds.

- *seconds*—Time period in seconds.

For example:

```
netbios name-cache query-timeout 15
```

[**no**] **netbios name-cache recognized-timeout** *seconds*

Specifies the dead time that starts when a host sends any NAME_RECOGNIZED frames. The router drops any duplicate frame sent by the same host during this time period. The **no** form restores the default of 1 second.

- *seconds*—Time period in seconds.

For example:

```
netbios name-cache recognized-timeout 3
```

[**no**] **netbios name-cache timeout** *minutes*

Enables NetBIOS name caching and specifies the timeout for entries. The **no** form restores the default of 15 minutes.

- *minutes*—Timeout period in minutes.

For example:

```
netbios name-cache timeout 10
```

rif *MAC-address* [*RIF-string*] [*interface-name* | **ring-group** *ring*]
[**no**] **rif** *MAC-address* [*interface-name* | **ring-group** *ring*]

Inserts or removes an entry into the RIF cache.

- *MAC-address*—12-digit hexadecimal string written as a dotted triplet.
- *RIF-string*—Series of four-digit hexadecimal numbers, each series separated by a dot (.).
- *interface-name*—The interface from which this RIF entry would have arrived.
- **ring-group** *ring*—The ring group number from which this RIF entry would have arrived.

For example:

```
rif 1000.5A01.0203 0830.0155.100a.5550
```

[**no**] **rif timeout** *minutes*

Defines the period of inactivity allowed before unused RIF cache entries are removed. The **no** form resets the RIF timeout period to the default, which is 15 minutes.

- *minutes*—Number of minutes.

For example:

```
rif timeout 20
```

[**no**] **source-bridge fst-peername** *local-interface-address*

Sets up a Fast Sequenced Transport (FST) peer name; this is the first step in configuring a remote source-route bridge to use FST.

- *local-interface-address*—Assigns the IP address to the local router.

For example:

```
source-bridge fst-peername 150.136.64.98
```

[**no**] **source-bridge largest-frame** *ring-group size*

Defines the largest frame size to communicate with all peers in the ring group.

- *ring-group*—Ring group number.
- *size*—Maximum frame size. The legal values for this argument are 516, 1500, 2052, 4472, 8144, 11407, and 17800 bytes.

For example:

```
source-bridge 5 2052
```

[**no**] **source-bridge old-oui**

Causes the OUI code in Token Ring frames translated to and from Ethernet Type II to be 0x000000. If you want to transfer data between IBM 8209 Ethernet/Token Ring bridges and routers running the SR/TLB software, you must issue this global command on each router. The **no** form restores the default value of 0x0000F8.

[**no**] **source-bridge passthrough** *ring-number*

Specifies that frames destined to ring number should never be terminated with Local Acknowledgment. The **no** form removes this restriction.

- *ring-number*—Ring number.

For example:

```
source-bridge passthrough 5
```

[**no**] **source-bridge proxy-netbios-only**

Allows using proxy explorers only for the NetBIOS name caching function and not for their general local response to explorers.

[**no**] **source-bridge remote-peer** *ring-group* **interface** [*interface-name MAC-address*] [**lf** *size*] [**version** *number*]

Defines or removes a serial interface over which to run bridged Token Ring traffic.

- *ring-group*—Ring group number.
- *interface-name*—Name of the serial interface.
- MAC-address—MAC address; required for nonserial interfaces.
- **lf** *size*—Largest frame size to send to the remote peer.
- **version** *number*—Specifies the forced RSRB protocol version number for the remote peer.

For example:

```
source-bridge remote-peer 5 interface serial0
```

[**no**] **source-bridge remote-peer** *ring-group* **tcp** *IP-address* [**lf** *size*] [**local-ack**] [**version** *number*]
[**no**] **source-bridge remote-peer** *ring-group* **tcp** *IP-address* [**backup-group** *group-number*]
[**no**] **source-bridge remote-peer** *ring-group* **fst** *IP-address* [**lf** *size*] [**version** *number*]

Defines or removes a remote peer for the specified ring group.

- *ring-group*—Ring group number.
- *IP-address*—IP address.
- **lf** *size*—Largest frame size to send to the remote peer.
- **local-ack**—Specifies that Local Acknowledgment should be used for LLC2 session going to this remote peer.
- **version** *number*—Specifies the forced RSRB protocol version number for the remote peer.
- **backup-group** *group-number*—Backup group number.
- **fst**—Specifies the Fast Sequenced Transport (FST).

For example:

```
source-bridge remote-peer 5 tcp 131.108.2.29
```

[**no**] **source-bridge ring-group** *ring-number*

Establishes or removes a ring group.

- *ring-number*—Ring group number.

For example:

```
source-bridge ring-group 5
```

[**no**] **source-bridge sap-80d5** *SAP*

When used in conjunction with the **source-bridge enable-80d5** command, enables or disables the translation of Token Ring LLC2 frames to Ethernet Type 2 80d5 format frames.

If the **source-bridge enable-80d5** command is not issued, this command has no effect. You can issue multiple commands, one SAP per line.

- *SAP*—Destination service access point (SAP).

For example:

```
source-bridge sap80d5 lc
```

[**no**] **source-bridge tcp-queue-max** *number*

Sets the maximum output TCP queue length, in packets, that the router will accept for routing to remote source-route bridge peers. The **no** version restores the default of 100.

- *number*—Number of packets.

For example:

```
source-bridge tcp-queue-max 125
```

Source-Route Bridging Interface Subcommands

[**no**] **access-expression** {**in** | **out**} *expression*

Defines an access expression for a given interface—for Token Ring only.

- **in** or **out**—Use **in** to specify that the expression applies to packets entering the interface. Use **out** to specify that it applies to packets leaving the interface.
- *expression*—A Boolean access list expression containing one or more of the following:

  lsap(nnn)—LSAP access list *nnn* to be evaluated for this frame.

  type(nnn)—SNAP type access list to be evaluated for this frame.

  smac(nnn)—Access list to match the source MAC address of the frame.

  dmac(nnn)—Access list to match the destination MAC address of the frame.

  netbios-host(name)—NetBIOS-host access list to be applied on NetBIOS frames traversing the interface.

  netbios-bytes(name)—NetBIOS-bytes access list to be applied on NetBIOS frames traversing the interface.

For example:

```
access-expression in lsap(201 | (lsap(202) & dm ac(701))
```

[**no**] **lnm alternate** *number*

Enables an LRM other than the default LRM to change parameters. The **no** form restores the default of 0.

- *number*—Integer between 0 and 3.

For example:

```
lnm alternate 2
```

[**no**] **lnm crs**

Enables the Configuration Report Server (CRS), which keeps track of the current logical configuration of a Token Ring. Reports any changes to LNM. Also reports on various other activities such as the change of the Active Monitor on a Token Ring.

[**no**] **lnm loss-threshold** *number*

Configures the threshold of dropped frames when the router sends a message to all attached LNMs. Default is 10 (0.1%).

- *number*—Number of frames dropped compared with number of frames forwarded, expressed as hundredths of a percent. Range: 0 through 9999.

For example:

```
lnm loss-threshold 2
```

[**no**] **lnm password** *number password*

Assigns a password to a reporting link to prevent unauthorized access from an LRM to a bridge and to control access to the different reporting links.

- *number*—Identifies the reporting link to which to apply the password.
- *password*—Password you enter at the keyboard. It can contain six to eight characters that can be any combination of letters and numbers and the characters @, #, $, and %.

For example:

```
lnm password 4 yourpassword
```

[**no**] **lnm rem**

Enables the Ring Error Monitor (REM), which monitors errors reported by any station on the ring. Also monitors whether the ring is in a functional state or in a failure state.

[**no**] **lnm rps**

Enables the Ring Parameter Server (RPS), which ensures that all stations on a ring are using a consistent set of reporting parameters. Reports to LNM when any new station joins a Token Ring.

[**no**] **lnm softerr** *number*

Controls the frequency of error reports sent from stations on a Token Ring to the Ring Error Monitor. The **no** form restores the timer value to its default of 200 (two seconds).

- *number*—Number of tens of milliseconds between error messages.

For example:

```
lnm softerr 100
```

[**no**] **locaddr-priority** *list*

Assigns a priority group to an input interface.

- *list*—An arbitrary, user-selected integer between 1 and 10 that identifies the LU address priority list.

For example:

```
locaddr-priority 1
```

mac-address *IEEE-address*

Sets the MAC layer address. Forces the use of a different MAC address on the specified interface, thereby avoiding the TI MAC firmware problem. It is up to the network administrator to ensure that no other host on the network is using that MAC address.

- *IEEE-address*—48-bit IEEE MAC address written as a dotted triple of four-digit hexadecimal numbers.

For example:

```
mac-address 79c1.39de.0003
```

[**no**] **multiring** {*protocol-keyword* | **all** | **other**}

Enables the ability of the specified interface to collect and use source-route (RIF) information for routable protocols.

- *protocol-keyword*, **all** or **other**—To enable the multiring for a single protocol, use one of the following keywords: **appletalk**, **ip**, or **novell**. To enable the multiring for all frames, use **all**. To enable the multiring for a frame not included in the list, use **other**.

For example:

```
multiring novell
```

[**no**] **netbios enable-name-cache**

Enables the NetBIOS name cache on the specified interface. By default the name cache is disabled. The **no** form restores the default.

[**no**] **netbios input-access-filter bytes** *name*

Defines an access list filter on incoming messages. The **no** form removes an access list filter on incoming messages.

- *name*—Name of a NetBIOS access filter.

For example:

```
netbios input-access-filter bytes marketing
```

[**no**] **netbios input-access-filter host** *name*

Defines an access list filter on incoming messages.

- *name*—Name of a NetBIOS access filter.

For example:

```
netbios input-access-filter host marketing
```

[**no**] **netbios output-access-filter bytes** *name*

Defines an access list filter on outgoing messages.

- *name*—Name of a NetBIOS access filter.

For example:

```
netbios output-access-filter bytes marketing
```

[**no**] **netbios output-access-filter host** *name*

Defines an access list filter on outgoing messages.

- *name*—Name of a NetBIOS access filter.

For example:

```
netbios output-access-filter host marketing
```

[**no**] **source-bridge** *local-ring bridge-number target-ring*

Enables source bridging on a specific interface.

- *local-ring*—Ring number from 1 through 4095 for this interface's Token Ring.
- *bridge-number*—Decimal number from 1 through 15 that uniquely identifies a bridge connecting the two rings.
- *target-ring*—Decimal ring number of the destination ring on this router/bridge. It also must be unique within the bridged Token Ring network.

For example:

```
source-bridge 129 1 130
```

[**no**] **source-bridge input-address-list** *list*

Interface subcommand that assigns an access list to a particular interface for filtering the Token Ring or IEEE 802 source addresses. The **no** version of this command removes the application of the access list.

- *list*—Access list number.

For example:

```
source-bridge input-address-list 201
```

source-bridge input-lsap-list *list*

Interface subcommand that alters IEEE 802-encapsulated packets on input. This access list is applied to all IEEE 802 frames received on that interface prior to the source-routing process. Specify the value 0 to disable the filter.

- *list*—Access list number.

For example:

```
source-bridge input-lsap-list 201
```

source-bridge input-type-list *list*

Interface subcommand that filters SNAP-encapsulated packets on input. This access list is then applied to all SNAP frames received on that interface prior to the source-routing process. Specify the value 0 to disable the filter.

- *list*—Access list number.

For example:

```
source-bridge input-type-list 201
```

[**no**] **source-bridge max-hops** *count*

Limits the maximum number of source-route bridge hops of your network. The **no** form restores the count to the maximum value.

- *count*—Defines the number of bridges that an explorer packet can traverse.

For example:

```
source-bridge max-hops 7
```

[**no**] **source-bridge old-sna**

Enables or disables a workaround for some source-route bridging behavior exhibited by older SNA nodes.

[**no**] **source-bridge output-address-list** *list*

Assigns or removes an access list to or from a particular interface for filtering the Token Ring or IEEE 802 destination addresses.

- *list*—Access list number.

For example:

```
source-bridge output-address-list 201
```

source-bridge output-lsap-list *list*

Filters IEEE 802-encapsulated packets on output. This access list is then applied just before sending out a frame to an interface. Specify 0 to disable the filter.

- *list*—Access list number.

For example:

```
source-bridge output-lsap-list 201
```

source-bridge output-type-list *list*

Filters SNAP-encapsulated packets on output. This access list is then applied just before sending out a frame to an interface. Specify 0 to disable the filter.

- *list*—Access list number.

For example:

```
source-bridge output-type-list 201
```

[**no**] **source-bridge proxy-explorer**

Enables or disables the proxy explorer function. Default is disabled.

[**no**] **source-bridge route-cache**

Enables fast switching to allow for faster implementations of local source-route bridging between the 4- or 16-megabit Token Ring card. By default, the system enables fast switching in the source-route bridging software. The **no** form restores the default, which is disabled.

[**no**] **source-bridge spanning**

Manually changes the forwarding state of spanning explorer packet. The **no** form disables forwarding.

Source-Route Bridging Show Commands

Table 4-15 lists the source-route bridging **show** commands.

Table 4-15 Source-Route Bridging Show Commands

Command	Display
show lnm bridge	All currently configured bridges and global bridging parameters.
show lnm config	Logical configuration of all bridges configured on this router.
show lnm interface [*interface*]	LNM parameters configured on the interface.
show lnm ring *number*	LNM parameters configured on the interface.
show lnm station	LNM-specific information about all known stations on the ring.
show local-ack	Current state of Local Acknowledgment connections.
show netbios-cache	Contents of the NetBIOS cache.
show rif	Contents of the RIF cache.
show source-bridge	Current source bridge configuration and statistics.