

Introduction

This booklet provides a summary of the commands a system administrator uses to configure a router for its routing and bridging tasks. The commands are listed in alphabetical order by command type within sections. The Table of Contents lists the section page numbers; the Index lists each command and the page where its description can be found. See the *Router Products Command Reference* publication for more complete descriptions and examples of the commands.

Conventions

The command descriptions use these conventions:

This document uses the following conventions:

- The symbol ^ represents the key labeled *Control*.
For example, the key combination ^D means hold down the *Control* key while you press the *D* key.
- A string is defined as a nonquoted set of characters. For example, when setting up a community string for SNMP to “public,” do not use quotes around the string, or the string will include the quotation marks.

Command descriptions use the following conventions:

- Examples that contain system prompts denote interactive sessions, indicating that the user enters commands at the prompt.
- Commands and keywords are in **boldface** font.
- Arguments for which you supply values are in *italic* font.
- Elements in square brackets ([]) are optional.
- Alternative but required keywords are grouped in braces ({ }) and separated by vertical bars (|).
- If the **no** form of the command is not explicitly explained in the description, it negates the command.

Examples use these conventions:

- Terminal sessions and information the system displays are in `screen` font.
- Information you enter is in **boldface screen** font.
- Nonprinting characters, such as passwords, are shown in angle brackets (< >).
- Default responses to system prompts are in square brackets ([]).
- Exclamation points (!) at the beginning of a line indicate a comment line.

Note Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

EXEC System Use

- Enter commands by typing 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 a >, as in this example:

```
Router>
```

There is also a privileged-level prompt available to the system administrator by entering a password. It is the server name followed by a #, as this example:

```
Router#
```

- Use the following editing commands when typing commands at the EXEC prompt:
 - Delete or Backspace to erase characters
 - Ctrl-U to delete a line
- As a shortcut, you can abbreviate commands to the fewest letters that make them unique. The letters “sho” can be entered for the **show** command, for example.

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

--More--

Press the space bar to continue the output or press Return to display the next line. Press any other key to return to the prompt.

System Help

You can obtain help in entering commands by using the following methods:

- For a brief description of the context-sensitive help system, type **help**.
- To list all commands for a command mode, enter a question mark (?) at the system prompt.
- To obtain a list of commands that start with a particular character set, enter an abbreviated command immediately followed by a question mark (?).
- To list a command's keywords or arguments, enter a question mark (?) in place of a keyword or argument on the command line.
- At any time during an active Telnet session, you can list the Telnet commands by typing the following command at the system prompt:

Ctrl-^ ?

Press the Ctrl, Shift, and 6 keys simultaneously, let go, and type ?.

The Configure Command

Use the privileged EXEC command **configure** to begin configuration of the router. The **configure** command has the following syntax:

configure [**terminal** | **memory** | **network**]

Permits you to configure the router from your terminal, from memory, or from a network server.

terminal	(Optional.) Executes configuration commands from the terminal (this is the default).
memory	(Optional.) Executes the configuration commands stored in NVRAM.
network	(Optional.) Retrieves the configuration commands stored in a file on a server.

To begin configuring the router, follow these steps:

Step 1 Enter privileged EXEC mode by typing **enable** at the EXEC prompt:

```
Router> enable
```

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

```
Password:
```

Step 2 Type 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
```

Step 4 The EXEC provides you with a simple editor for entering the configuration commands and explains the editing functions:

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

The following table lists the edit key and command functions and their meanings.

Key or Command	Function
Tab	Completes a partial command name entry. When you enter a unique set of characters and press the Tab key, the system completes the command name. If you enter a set of characters that could indicate more than one command, the system beeps to indicate an error. Enter a question mark (?) immediately following the partial command (no space). The system provides a list of commands that begin with that string.
Delete or Backspace	Erases the character to the left of the cursor.
Return	At the command line, pressing the Return key performs the function of processing a command. At the “---more---” prompt on a terminal screen, pressing the Return key scrolls down a line.
Space Bar	Allows you to see more output on the terminal screen. Press the space bar when you see the line “---more---” on the screen to display the next screen.
Left Arrow ¹	Moves the cursor one character to the left. When you enter a command that extends beyond a single line, you can press the Left Arrow key repeatedly to scroll back toward the system prompt and verify the beginning of the command entry.
Right Arrow ¹	Moves the cursor one character to the right.
Ctrl-A	Moves the cursor to the beginning of the line.
Ctrl-B	Moves the cursor back one character.

Key or Command	Function
Ctrl-D	Deletes the character at the cursor.
Ctrl-E	Moves the cursor to the end of the command line.
Ctrl-F	Moves the cursor forward one character.
Ctrl-K	Deletes all characters from the cursor to the end of the command line.
Ctrl-L and Ctrl-R	Redisplay the system prompt and command line.
Ctrl-T	Transposes the character to the left of the cursor with the character located at the cursor.
Ctrl-U and Ctrl-X	Deletes all characters from the cursor back to the beginning of the command line.
Ctrl-V and Esc Q	Inserts a code to indicate to the system that the keystroke immediately following should be treated as a command entry, <i>not</i> as an editing key.
Ctrl-W	Deletes the word to the left of the cursor.
Ctrl-Y	Recalls the most recent entry in the delete buffer. The delete buffer contains the last ten items you have deleted or cut. Ctrl-Y can be used in conjunction with Esc Y.
Ctrl-Z	Ends configuration mode and returns you to the EXEC prompt.
Esc B	Moves the cursor back one word.
Esc C	Capitalizes the word at the cursor.
Esc D	Deletes from the cursor to the end of the word.
Esc F	Moves the cursor forward one word.

Key or Command	Function
Esc L	Changes the word at the cursor to lowercase.
Esc U	Capitalizes from the cursor to the end of the word.
Esc Y	Recalls the next buffer entry. The buffer contains the last ten items you have deleted. Press Ctrl-Y first to recall the most recent entry. Then press Esc Y up to nine times to recall the remaining entries in the buffer. If you bypass an entry, continue to press Esc Y to cycle back to it.

1. The arrow keys function only with ANSI-compatible terminals.

The following table lists the editing keys and functions of the earlier software releases:

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

To end configuration mode, press Ctrl-Z or type **end**. Enter the **disable** EXEC command to return to the EXEC prompt.

Configuration Command Modes

Configuration commands are categorized by these functions:

- Global configuration commands—Define system-wide parameters.
- Interface configuration commands—Define the characteristics of an interface (a serial or Ethernet interface, for example) and must be preceded by an **interface** command.
- Subinterface commands—Define the characteristics of multiple virtual interfaces on single physical interfaces, and must be preceded by an **interface** command. A second **interface** command specifies the subinterface. Subinterfaces can be configured for point-to-point or multipoint environments.
- Line configuration commands—Define the characteristics of a serial line and must be preceded by a **line** command.
- Router configuration commands—Specify a routing protocol (IGRP, OSPF, and so on) and must be preceded by a **router** command.

Observe the following guidelines when you enter configuration commands:

- As with EXEC commands, you can type configuration commands 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

System use commands include the following types of commands:

- EXEC terminal use commands
- EXEC terminal parameter setting commands
- System use show commands

EXEC Terminal Use Commands

Enter the following commands from within EXEC mode.

clear line *line-number*

Aborts connections and processes and resets a terminal line.

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

Example

```
clear line 3
```

{connect | telnet} *host* [*port*] [*keyword*]

Makes a Telnet connection.

host Host name or an Internet address.
port (Optional.) Decimal TCP port number; the default is the Telnet server port (decimal 23) on the host.
keyword (Optional.) Keyword that can be set with the connection; see the following table for a list of keywords.

Keyword	Description
/route: <i>path</i>	Specifies loose source routing. The argument <i>path</i> is a list of host names or Internet addresses that specifies network nodes, ending with the final destination.
/line	Enables Telnet line mode. In this mode, the router does not send any data to the host until you press Return. The /line keyword is a local option; the remote server is not notified of the mode change.
/debug	Enables Telnet debugging mode.
/stream	Turns on stream processing, which enables a raw TCP stream with no Telnet control sequences. A stream connection does not process Telnet options and may be appropriate for connections to ports running UUCP and other non-Telnet protocols.

Example

```
connect router
```

disconnect [*connection*]

Closes a connection.

connection (Optional.) Connection name or number displayed by the **show users** command; the default is the current connection.

Example

```
disconnect 2
```

end

Exit from configuration mode.

exit

Exits any command mode. For example, to end interface configuration mode and return to global configuration mode, type **exit**.

lock

Prevents access to your session while keeping your connection open.

login (EXEC)

Logs you into a server. Enter a username and password when prompted. When using the login command to access a system with TACACS security you can type your name or specify a TACACS server **user@hostname** or **user@IP address**. The server must be one of the servers defined in a configuration with the **tacacs-server host** command.

Example

In the following example, user bob specifies TACACS host1 to authenticate his password.

```
router> login
Username: bob@host1
Translating "HOST1"...domain server (131.108.1.111) [OK]
```

{logout | quit}

Either 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*] [*keyword*]

Resumes a connection.

connection (Optional.) Connection name or number displayed by the show users command; the default is the current connection.

keyword (Optional.) Keyword that can be set; see the following table for a list of keywords.

Keyword	Description
/line	Enables Telnet line mode. In this mode, the router does not send any data to the host until the user presses Return. The /line keyword is a local switch; the remote server is not notified of the mode change.
/noline	Disables Telnet line mode and enables character-at-a-time mode (default).
/debug	Enables Telnet debugging mode.
/nodebug	Disables Telnet debugging mode (default).
/stream	Turns on stream processing, which enables a raw TCP stream with no Telnet control sequences. A stream connection does no processing of Telnet options and may be appropriate for connections to ports running UUCP and other non-Telnet protocols.
/nostream	Turns off stream processing, which enables the Telnet protocol (default).
/echo	Enables local echoing of characters (default). The /echo keyword is a local switch; the remote server is not notified of the state change.
/noecho	Disables local echoing of characters.
/set	Sets X.3 connection options.

Example

```
resume 3
```

ppp [**default** | *client* [*@tacacs-server*]] [**/routing**]

Makes an asynchronous connection from the auxiliary port using the PPP protocol.

default	(Optional.) Used to make a PPP connection when a default address has been configured.
<i>client</i>	(Optional.) IP address or the name of the client workstation or PC.
<i>@tacacs-server</i>	(Optional.) IP address or IP hostname of the TACACS server to which the user's TACACS authentication request is to be sent.
/routing	(Optional.) Indicates asynchronous routing is enabled.

[no] slip [**default** | *client* [*@tacacs-server*]] [**/routing**] [**/compressed**]

Makes a SLIP connection on the auxiliary port.

default	(Optional.) Used to make a SLIP connection when a default address has been configured.
<i>client</i>	(Optional.) IP address or the name of the client workstation or PC.
<i>@tacacs-server</i>	(Optional.) IP address or IP hostname of the TACACS server to which the user's TACACS authentication request is sent.
/routing	(Optional.) Indicates routing is enabled. Interface <i>async 1</i> must be configured for async dynamic routing.
/compressed	(Optional.) Indicates IP header compression should be used on the link.

where

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

EXEC Terminal Parameter Setting Commands

Enter the following commands to modify a line on the router, except for the **terminal ?** command, which lists the available commands.

terminal ?

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

terminal databits {5 | 6 | 7 | 8}

Sets the number of data bits per character that are interpreted and generated by hardware for the current terminal line.

- 5** Five data bits per character.
- 6** Six data bits per character.
- 7** Seven data bits per character.
- 8** Eight data bits per character.

terminal data-character-bits {7 | 8}

Sets the number of data bits per character that are interpreted and generated by software for the current line.

- 7** Seven data bits per character.
- 8** Eight data bits per character.

terminal [no] dispatch-character *ASCII-number1* [*ASCII-number2* . . . *ASCII-number*]

Defines a character that causes a packet to be sent for the current terminal line.

- ASCII-number* The ASCII decimal representation of the character, such as Return (ASCII character 13) for line-at-a-time transmissions.

terminal [no] dispatch-timeout *milliseconds*

Sets the character dispatch timer for the current terminal line.

milliseconds The number of milliseconds the router waits after putting the first character into a packet buffer before sending the packet.

terminal [no] download

Temporarily sets the ability of a line to act as a transparent pipe for file transfers.

terminal [no] editing

Enables the enhanced editing mode on the local line.

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

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

ASCII-number Either the ASCII decimal representation of an escape character or a control sequence.

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 flowcontrol { **none** | **software** [**in** | **out**] | **hardware** }

Sets up the method of data flow control for the current terminal line.

- none** Prevents flow control.
- software** Sets software flow control. Default is both directions. Use the optional keyword **in** to listen to flow control from the attached device; use **out** to send flow control information to the attached device.
- hardware** Sets hardware flow control (see your hardware manual).

terminal [**no**] **history size** *number of lines*

Changes the command history buffer size for the current terminal session.

- number of lines* Number of command lines that the system will record in its history buffer (0 through 256).

terminal hold-character *ASCII-number*

Sets the hold character.

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

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

Sets the terminal screen length. A screen length of zero 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.

Example

```
terminal length 0
```

System Use Commands

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 *ASCII-number count*

Sets the padding on a specific output character for the current terminal line.

<i>ASCII-number</i>	ASCII decimal representation of the character.
<i>count</i>	Number of NULL bytes sent after that character.

Example

```
terminal padding 25 20
```

terminal parity {none | even | odd | space | mark}

Defines the generation of the parity bit for the current terminal line.

none	No parity.
even	Even parity.
odd	Odd parity.
space	Space parity.
mark	Mark parity.

terminal rxspeed *bps*

Sets the terminal baud rate receive (from terminal) speed for the current terminal line.

bps Baud rate in bits per second (bps).

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

Sets a mode that compares typed-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 speed *bps*

Sets the terminal baud rate for the current terminal line. The command sets both the transmit (to terminal) and receive (from terminal) speeds.

bps Baud rate in bits per second (bps).

terminal [no] start-character *ASCII-number*

Sets the flow control start character for the current terminal line. The command defines the character that signals the start of data transmission when software flow control is in effect. The **terminal no start-character** command removes the character.

ASCII-number ASCII decimal representation of the start character.

terminal [no] stop-character *ASCII-number*

Sets the flow control stop character for the current terminal line. The command defines the character that signals the end of data transmission when software flow control is in effect. The **terminal no stop-character** command removes the character.

ASCII-number ASCII decimal representation of the stop character.

terminal [no] stopbits {1 | 1.5 | 2}

Sets the number of stop bits transmitted per byte by the current terminal line.

- 1 One stop bit.
- 1.5 One and a half stop bits.
- 2 Two stop bits.

terminal telnet break-on-ip

terminal telnet refuse-negotiations

terminal telnet speed *default-speed maximum-speed*

terminal telnet sync-on-break

terminal telnet transparent

Configures the Telnet capabilities for the current line.

- break-on-ip** Causes the system to generate a hardware Break signal on the RS-232 line that is associated with a reverse Telnet connection.
- refuse-negotiations** Sets a line using Telnet to refuse to negotiate full duplex, remote echo options on incoming connections.
- speed** Negotiates speeds on reverse Telnet lines.
default-speed Used only with the **speed** keyword. Sets the line speed that the router will use if the device on the other end of the connection has not specified a speed.

<i>maximum-speed</i>	Used only with the speed keyword. Specifies the maximum speed the router will use.
sync-on-break	Causes a reverse Telnet line to send a Telnet Synchronize signal when it receives a Telnet Break signal.
transparent	To send a Return (CR) as a CR followed by a NULL instead of a CR followed by a Line Feed (LF) on Telnet lines.

terminal [no] terminal-type terminal-name

Records, removes, or changes the current terminal type.

terminal-name Terminal name and type.

Example

```
terminal terminal-type VT100
```

terminal transport [none | telnet]

Provides restrictions on lines for the current session.

terminal txspeed bps

Sets the terminal transmit baud rate (to terminal) on the current terminal line.

bps Baud rate in bits per second (bps).

terminal [no] width characters

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

characters Number of character columns displayed on the terminal.

System Use Commands

Example

```
terminal width 132
```

System Use Show Commands

The following table lists the system use show commands:

Command	Display
show history	Lists the commands entered in the current EXEC session.
show sessions	Information about open Telnet connections.
show tcp [<i>line-number</i>]	Status of all TCP connections, or, if the <i>line-number</i> 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

The system management commands include the following:

- EXEC system management commands
- Global system management commands
- System management show commands

EXEC System Management Commands

Execute any of the following commands at the EXEC prompt.

[no] calendar set *hh:mm:ss day month year*

[no] calendar set *hh:mm:ss month day year*

Sets the Cisco 7000 system calendar (and thus the system clock).

hh:mm:ss Current time in hours (military format), minutes, and seconds.

day Current day (by date) in the month.

month Current month (by name).

year Current year (no abbreviation).

clear rif-cache

Clears entries from the Routing Information Field (RIF) cache.

clock read-calendar

Manually reads the calendar into the Cisco 7000 system clock.

[no] clock set *hh:mm:ss day month year*

[no] clock set *hh:mm:ss month day year*

Manually sets the system clock.

hh:mm:ss Current time in hours (military format), minutes, and seconds.

day Current day (by date) in the month.

month Current month (by name).

year Current year (no abbreviation).

clock update-calendar

Sets the Cisco 7000 calendar from the system clock.

copy flash tftp

Copies a Flash TFTP image back to a TFTP server.

copy tftp flash

Copies a TFTP image into the current Flash configuration.

copy verify

Provides a checksum on Flash memory.

debug ?

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

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

ping [*protocol*] {*host* | *address*} (privileged)

Diagnoses basic network connectivity on AppleTalk, CLNS, IP, Novell, Apollo, VINES, DECnet, or XNS networks.

protocol (Optional.) Protocol keyword, one of **appletalk**, **clns**, **ip**, **novell**, **apollo**, **vines**, **decnet**, or **xns**.

host Host name of the system to ping.

address Protocol address of system to ping.

ping [*protocol*] {*host* | *address*} (user)

Diagnoses basic network connectivity on AppleTalk, CLNS, IP, Novell, Apollo, VINES, DECnet, or XNS networks.

protocol (Optional.) Protocol keyword, one of **appletalk**, **clns**, **ip**, **novell**, **apollo**, **vines**, **decnet**, or **xns**.

host Host name of the system to ping.

address Protocol address of system to ping.

reload

Reloads the operating system.

show ?

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

test flash

Tests Flash memory on MCI and envm Flash EPROM interfaces.

test interfaces

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

System Management Commands

test memory

Intended for use by technical 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 both IP and CLNS route tracing. To terminate the **trace** command operation, type the escape sequence.

destination (Optional.) Destination address or host name
on the command line.

[no] debug *option*

Enables and disables diagnostic output.

Examples

```
debug packet  
no debug 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 to 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.

write terminal

Displays the current configuration information.

Global System Management Commands

Enter the following commands from within global configuration mode.

[no] access-list

Creates an access list providing restriction specifications. You can create access lists for the protocols listed in the following table.

Protocol	Range
IP	1–99
Extended IP	100–199
Transparent Bridging (protocol type)	200–299
Transparent Bridging (vendor code)	700–799
Extended Transparent Bridging	1100–1199
Standard VINES	1–199
Extended VINES	100–199
Simple VINES	200–299
DECnet	300–399
XNS	400–499
Extended XNS	500–599
AppleTalk	600–699
Ethernet address	700–799
Novell	800–899
Extended Novell	900–999
Novell SAP	1000–1099

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

Makes adjustments to initial buffer pool settings and to the limits at which temporary buffers are created and destroyed. Use this command only if instructed to by technical personnel.

big	Big buffer size.
huge	Huge buffer size.
large	Large buffer size.
middle	Medium buffer size.
small	Small buffer size.
initial	Number of additional temporary buffers to be allocated when the system is reloaded. Use to ensure that the system has necessary buffers immediately after reloading in a high-traffic environment.
max-free	Maximum number of free or unallocated buffers in a buffer pool.
min-free	Minimum number of free or unallocated buffers in a buffer pool.
permanent	Number of permanent buffers that the system tries to allocate. Permanent buffers are normally not deallocated by the system.
<i>number</i>	Number of buffers to be allocated.

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** form with the argument restores the default buffer values. Use this command only when instructed to by your technical support personnel.

<i>number</i>	Size of huge buffers.
---------------	-----------------------

Example

```
buffers huge size 20000
```

[no] clock calendar-valid

Configures the Cisco 7000 as a time source for a network based on its calendar.

[no] clock summer-time *name date date month year hh:mm date month year hh:mm [offset]*

[no] clock summer-time *name date month date year hh:mm month date year hh:mm [offset]*

[no] clock summer-time *name recurring [week day month hh:mm week day month hh:mm [offset]]*

Each variation of the **clock summer-time** command configures the system to automatically switch to summer time (daylight savings time).

<i>name</i>	Name of the time zone (PDT, ...).
<i>week</i>	Week of the month (1-5 or last).
<i>day</i>	Day of the week (Sunday, Monday, ...).
<i>date</i>	Date of the month (1-31).
<i>month</i>	Month (January, February, ...).
<i>year</i>	Year (1993-2035).
<i>hh:mm</i>	Time (military format) in hours and minutes.
<i>offset</i>	(Optional.) Number of minutes to add during summer time. Default is 60.

[no] clock timezone *name hours [minutes]*

Sets the time zone for display purposes. The **no clock timezone** command sets the time to Coordinated Universal Time.

name Name of the time zone.
hours Hours offset from UTC.
minutes (Optional.) Minutes offset from UTC.

[no] logging *host*

Logs messages to a syslog server host. This command identifies a syslog server host to receive logging messages. By issuing this command more than once, you build a list of syslog servers that receive logging messages.

host Name or Internet address of the host to be used as a syslog server.

[no] logging facility *facility-type*

Configures the syslog facility. To revert to the default of local7, use the **no logging facility** command.

facility-type See the following table for the *facility-type* keywords.

Keyword	Description
auth	Authorization system
cron	Cron facility
daemon	System daemon
kern	Kernel
local0-7	Reserved for locally defined messages
lpr	Line printer system
mail	Mail system
news	USENET news

Keyword	Description
sys9	System use
sys10	System use
sys11	System use
sys12	System use
sys13	System use
sys14	System use
syslog	System log
user	User process
uucp	UNIX-to-UNIX copy system

[no] ntp access-group { query-only | serve-only | serve | peer } number

Controls access to the system's Network Time Protocol (NTP) services.

query-only	Allows only NTP control queries.
serve-only	Allows only time requests.
serve	Allows time requests and NTP control queries, but does not allow the system to synchronize to the remote system.
peer	Allows time requests and NTP control queries and allows the system to synchronize to the remote system.
<i>number</i>	Number (1 to 99) of a standard IP access list.

[no] ntp authenticate

Enables NTP authentication.

[no] ntp authentication-key *number md5 value*

Defines an authentication key for NTP.

<i>number</i>	Key number (1 to 4294967295).
<i>value</i>	Key value (an arbitrary string of up to eight characters).

[no] ntp broadcastdelay *microseconds*

Sets the estimated round-trip delay between the router and a Network Time Protocol (NTP) broadcast server.

<i>microseconds</i>	Estimated round-trip time (in microseconds) for NTP broadcasts. The range is from 1 to 999999.
---------------------	--

[no] ntp clock-period *value*

As NTP compensates for the error in the system clock, it keeps track of the correction factor for this error. The system will automatically save this value into the system configuration using the `ntp clock-period` command.

<i>value</i>	Amount to add to the system clock for each clock hardware tick.
--------------	---

[no] ntp master [*stratum*]

Configures the router as an NTP master clock to which peers synchronize themselves when an external NTP source is not available.

<i>stratum</i>	(Optional.) Number from 1 to 15. Indicates the NTP stratum number that the system will claim.
----------------	---

[no] ntp peer *ip-address* [**version number**] [**key keyid**] [**source interface**] [**prefer**]

Configures the router's system clock to synchronize a peer or to be synchronized by a peer.

<i>ip-address</i>	IP address of the peer providing, or being provided, the clock synchronization.
version number	(Optional.) Defines the NTP version number. NTP version number (1 to 3).
key keyid	(Optional.) Defines the authentication key. Authentication key to use when sending packets to this peer.
source interface	(Optional.) Names the interface. Name of the interface from which to pick the IP source address.
prefer	(Optional.) Makes this peer the preferred peer that provides synchronization.

[no] ntp server *ip-address* [**version number**] [**key keyid**] [**source interface**] [**prefer**]

Allows the router's system clock to be synchronized by a time server.

<i>ip-address</i>	IP address of the peer providing, or being provided, the clock synchronization.
version number	(Optional.) Defines the NTP version number. NTP version number (1 to 3).
key keyid	(Optional.) Defines the authentication key. Authentication key to use when sending packets to this peer.

source (Optional.) Names the interface.
interface Name of the interface from which to pick the IP source address.
prefer (Optional.) Makes this peer the preferred peer that provides synchronization.

[no] ntp source *interface*

Uses a particular source address in NTP packets.

interface Any valid system interface name.

[no] ntp trusted-key *key-number*

Authenticates the identity of a system to which NTP will synchronize.

key-number Key number of authentication key to be trusted.

[no] ntp update-calendar

Periodically updates the Cisco 7000 calendar from NTP.

[no] priority-list *list* default {high** | **medium** | **normal** | **low**}**

Assigns a priority queue for those packets that do not match any other rule in the priority list.

list Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.

default Assigns a new priority queue default.

high | medium | normal | low Priority queue level.

Example

```
priority-list 2 default medium
```

[no] priority-list list interface interface-type interface-number {high | medium | normal | low}

Establishes queuing priorities on packets entering from a given interface.

<i>list</i>	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
interface	Selects queuing based on interface type.
<i>interface-type</i>	Specifies the name of the interface.
<i>interface-number</i>	Number of the specified interface.
high medium normal low	Priority queue level.

Example

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

[no] priority-list list protocol protocol-name {high | medium | normal | low} queue-keyword keyword-value

Establishes queuing priorities based upon the protocol type. Use the no priority-list command with the appropriate list number to remove an entry from the list.

<i>list</i>	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
protocol	Selects queuing based on protocol.
<i>protocol-name</i>	Specifies the protocol types: aarp , arp , apollo , appletalk , bridge (transparent), clns , clns_es , clns_is , compressedtcp , cmns , decnet , decnet_node , decnet_router , ip , ipx , pad , rsrb , stun , vines , xns , and x25 .

high | medium | normal | low | Priority queue level.

queue-keyword | Possible keywords are **gt**, **lt**, **list**, **tcp**, and **udp**. Refer to the following table for descriptions of these keywords.

keyword-value | A number that depends on *queue-keyword*.

Keyword	Description
gt <i>byte-count</i>	Specifies a greater-than count. The priority level assigned goes into effect when a packet exceeds the value entered for the argument <i>byte-count</i> . The packet size also includes bytes due to MAC encapsulation on the outgoing interface.
lt <i>byte-count</i>	Specifies a less-than count. The priority level assigned goes into effect when a packet size is less than the value entered for <i>byte-count</i> . The packet size also includes bytes due to MAC encapsulation on the outgoing interface.
list <i>list-number</i>	Assigns traffic priorities according to a specified list when used with Appletalk, bridging, IP, IPX, VINES, or XNS. The <i>list-number</i> argument is the IP access list number as specified by the access-list global configuration command.
tcp <i>port</i>	Assigns the priority level defined to TCP segments originating from or destined to a specified port (for use with the IP protocol only). Refer to the TCP Service table.
udp <i>port</i>	Assigns the priority level defined to UDP packets originating from or destined to the specified port (for use with the IP protocol only). Refer to the UDP Service table.

TCP Service	Port
Telnet	23
SMTP	25

UDP Service	Port
TFTP	69
NFS	2049
SNMP	161
RPC	111
DNS	53

Example

```
priority-list 1 protocol decnet high
priority-list 4 protocol decnet 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 be waiting in each of the priority queues.

<i>list</i>	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
queue-limit	Required keyword that precedes the queue size.
<i>high-limit medium-limit normal-limit low-limit</i>	Priority queue value. A value of 0 for any of the four arguments means that the queue can be of unlimited size for that particular queue.

Example

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

[no] priority-list *list* **stun** {**high** | **medium** | **normal** | **low**} **address**
group-number address-number

Establishes queuing priorities based on the address of the serial link on a STUN connection.

<i>list</i>	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
stun	Indicates this is a serial tunnel feature.
high medium normal low	Priority queue level.
address	Required keyword.
<i>group-number</i>	Group number used in the stun group command.
<i>address-number</i>	Address of the serial link. The format of the address is either a 1-byte hex value (for example, C1) for an SDLC link or one that is specified by the stun schema global configuration command.

Example

```
priority list 1 stun high address 1 C1
```

[no] queue-list *list* **default** *queue-number*

Assigns a priority queue for those packets that do not match any other rule in the queue list.

<i>list</i>	Queue list number. An integer from 1 to 10.
default	Assigns a new queue default.
<i>queue-number</i>	Number of the queue. An integer from 1 to 10.

[no] queue-list list interface *interface-type interface-number queue-number*

Establishes queuing priorities on packets entering on an interface.

<i>list</i>	Queue list number. An integer from 1 to 10.
interface	Selects queuing based on interface type.
<i>interface-type</i>	Specifies the name of the interface.
<i>interface-number</i>	Number of the specified interface.
<i>queue-number</i>	Queue list number. An integer from 1 to 10.

[no] queue-list list protocol *protocol-name queue-number queue-keyword keyword-value*

Establishes queuing priority based upon the protocol type.

<i>list</i>	Queue list number. An integer from 1 to 10.
protocol	Selects queuing based on protocol.
<i>protocol-name</i>	Specifies the protocol types: aarp , arp , apollo , appletalk , bridge (transparent), clns , clns_es , clns_is , compressedtcp , cmns , decnet , decnet_node , decnet_router , ip , ipx , pad , rsrb , stun , vines , xns , and x25 .
<i>queue-number</i>	Number of the queue. An integer from 1 to 10.
<i>queue-keyword</i>	Possible keywords are gt , lt , list , tcp , and udp .
<i>keyword-value</i>	Refer to the following table for descriptions of these keywords.

Keyword	Description
gt <i>byte-count</i>	Specifies a greater-than count. The priority level assigned goes into effect when a packet exceeds the value entered for the argument <i>byte-count</i> . The packet size also includes bytes due to MAC encapsulation on the outgoing interface.
lt <i>byte-count</i>	Specifies a less-than count. The priority level assigned goes into effect when a packet size is less than the value entered for <i>byte-count</i> . The packet size also includes bytes due to MAC encapsulation on the outgoing interface.
list <i>list-number</i>	Assigns traffic priorities according to a specified list when used with Appletalk, bridging, IP, IPX, VINES, or XNS. The <i>list-number</i> argument is the IP access list number as specified by the access-list global configuration command.
tcp <i>port</i>	Assigns the priority level defined to TCP segments originating from or destined to a specified port (for use with the IP protocol only). Refer to the TCP Service table.
udp <i>port</i>	Assigns the priority level defined to UDP packets originating from or destined to the specified port (for use with the IP protocol only). Refer to the UDP Service table.

TCP Service	Port
Telnet	23
SMTP	25

UDP Service	Port
TFTP	69
NFS	2049
SNMP	161
RPC	111
DNS	53

[no] queue-list list queue queue-number byte-count byte-count-number

Designates the byte size allowed per queue.

<i>list</i>	Queue list number. An integer from 1 to 10.
queue	Establishes the queue.
<i>queue-number</i>	Number of the queue. An integer from 1 to 10.
byte-count	Sets the byte count.
<i>byte-count-number</i>	Specifies the lower boundary on how many bytes the system allows to be delivered from a given queue during a particular cycle.

[no] queue-list list queue queue-number limit limit-number

Designates the queue length limit for a queue.

<i>list</i>	Queue list number. An integer from 1 to 10.
queue	Establishes the queue.
<i>queue-number</i>	Number of the queue. An integer from 1 to 10.
limit	Designates the queue length limit.
<i>limit number</i>	Maximum number of packets that can be enqueued at any time. From 0 through 32767 queue entries.

[no] queue-list list stun address group-number address-number

Establishes queuing priorities based on the address of the serial link on a STUN connection.

<i>list</i>	Queue list number. An integer from 1 to 10.
stun	Establishes priority queuing by protocol type.

address	Required keyword.
<i>group-number</i>	Group number used in the stun group command.
<i>address-number</i>	Address of the serial link. The format of the address is either a 1-byte hex value (for example, C1) for an SDLC link or one that is specified by the stun schema global configuration command.

[no] service exec-wait

Delays the startup of the EXEC on noisy lines.

[no] service finger

Allows Finger protocol requests to be made of the network server. This service is equivalent to issuing a remote **show users** command.

[no] service nagle

Sets the nagle congestion control algorithm.

[no] service tcp-keepalives {in | out}

Generates keepalive packets on idle network connections.

in	Generates keepalives on incoming connections (initiated by remote host).
out	Generates keepalives on outgoing connections (initiated by a user).

[no] service telnet-zeroidle

Sets the TCP window to zero (0) when the connection is idle.

[no] snmp server chassis-id *text*

Provides a message line identifying the SNMP server serial number.

text Message to identify the chassis serial number.

snmp-server contact *text*

Sets the system contact string.

text String that describes the system contact information.

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

Specifies the recipient of an SNMP trap operation.

address Name or Internet address of the host.

community-string Password-like community string to send with the trap operation.

snmp (Optional.) Enables the SNMP traps defined in RFC 1157.

tty (Optional.) Enables Cisco enterprise-specific traps when a TCP connection closes.

snmp-server location *text*

Sets the system location string.

text String that describes the system location information.

[no] snmp-server trap-source *interface-type interface-number*

Specifies the interface (and hence the corresponding IP address) from which an SNMP trap should originate.

interface-type Interface from which the SNMP trap originates.

interface-number Interface number from which the SNMP trap originates.

System Management Show Commands

The following table lists the system management show commands:

Command	Display
show access-lists	Shows the configured access lists for the system.
show buffers [<i>interface</i>]	Statistics for the buffer pools on the network server. The <i>interface</i> argument specifies a search of only those buffers that have been associated with the interface for longer than one minute.
show calendar	Displays the calendar hardware setting for the Cisco 7000.
show clock [detail]	Displays the system clock. The optional keyword detail indicates the clock source (NTP, VINES, 7000 calendar, and so forth).
show configuration	Contents of nonvolatile memory.
show debugging	Current settings of the debug command options.
show environment all	Temperature and voltage information on the console.
show environment last	Last measured value from each of six test points when the system shuts down due to detection of fatal environmental margins.

Command	Display
show environment table	Displays environmental measurements and a table listing environment measurements within specification. This command is available on the Cisco 7000 only.
show flash [all]	Information about each Flash memory device.
show line [line-number]	Displays a terminal line's parameters. The <i>line-number</i> argument is the absolute line number of the line for which you want to list parameters.
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 [type] [free]	Shows statistics about the router's memory, including memory free pool statistics. The optional argument <i>type</i> is the memory type to display (processor, multibus, io, sram). If <i>type</i> is not specified, statistics for all memory types present in the router will be displayed. The optional keyword free displays free memory statistics.
show microcode	Lists the microcode bundled into the system.
show ntp associations [detail]	Displays the status of NTP associations. The optional keyword detail shows detailed information about each NTP association.
show ntp status	Displays the status of NTP.
show processes [cpu]	Displays information about the active processes. The optional keyword cpu shows detailed CPU utilization statistics.
show processes memory	Information about memory utilization.

System Management Commands

Command	Display
show protocols	Displays the configured protocols. This command shows the global and interface-specific status of any configured Level 3 protocol; for example, IP, DECnet, Novell, AppleTalk, and so forth.
show snmp	Checks the status of communications between the SNMP agent and SNMP manager.
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 the following types:

- System ROM monitor commands
- System global configuration commands
- System interface configuration commands
- Line configuration commands

System ROM Monitor Commands

Enter the following commands from the ROM Monitor prompt (>).

b flash [*filename*]

Manually boots the system from Flash memory.

filename (Optional.) The filename of the image you want loaded. This name is case sensitive.

b [*filename*] [*address*]

Manually boots the router. Without the arguments, the router boots from ROM.

filename (Optional). The filename of the image you want loaded. This name is case sensitive.

address (Optional). IP address of the TFTP server on which the system image resides.

o

Displays the configuration register setting currently in effect, with a description of the bits.

o/r

Resets the virtual configuration register to the defaults, which causes the router to boot from ROM.

System Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] banner motd *d message d*

Specifies a message-of-the-day (MOTD) banner.

d Delimiting character of your choice—a pound sign (#), for example. You cannot use the delimiting character in the banner message.

message Message text.

Example

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

[no] boot bootstrap flash [*filename*]

[no] boot bootstrap mop [*filename*] [*mac-address*] [*interface*]

[no] boot bootstrap tftp [*filename*] [*address*]

Each of these commands causes the system to boot a secondary bootstrap image.

flash Boot from Flash memory.

mop Netboot from a system image stored on a DEC MOP server.

tftp (Optional.) Netboot from a system image on a TFTP server.

filename Name of the system image from which you want to netboot.

<i>address</i>	(Optional.) IP address of the TFTP server on which the system image resides.
<i>mac-address</i>	(Optional.) MAC address of the MOP server on which the file resides.
<i>interface</i>	(Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are async , dialer , Ethernet , loopback , null , serial , and tunnel .

[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.

Example

```
boot buffersize 64
```

[no] boot host mop *filename* [*mac-address*] [*interface*]

[no] boot host [tftp] *filename* [*address*]

Changes the default name of the host configuration filename from which you want to load configuration commands.

tftp (Optional.) Boot from a system image on a TFTP server.

filename Name of the system image from which you want to netboot.

- address* (Optional.) IP address of the TFTP server on which the system image resides.
- mac-address* (Optional.) MAC address of the MOP server on which the file resides.
- interface* (Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are **async**, **dialer**, **Ethernet**, **loopback**, **null**, **serial**, and **tunnel**.

Example

```
boot host config1
```

[no] boot network mop *filename* [*mac-address*] [*interface*]
[no] boot network [tftp] *filename* [*address*]

Changes the default name of the network configuration file from which you want to load configuration commands.

- mop** Configures from a file stored on a DEC MOP server.
- tftp** (Optional.) Configures from a file stored on a TFTP server.
- filename* Configuration file.
- mac-address* (Optional.) MAC address of the MOP server on which the file resides.
- interface* (Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are **async**, **dialer**, **Ethernet**, **serial**, and **tunnel**.
- address* (Optional.) IP address of the TFTP server on which the file resides.

Example

```
boot network config2
```

[no] boot system flash *filename*
[no] boot system mop *filename* *mac-address* *interface*
[no] boot system rom
[no] boot system **[tftp]** *filename* *address*
[no] boot system

Changes the filename of the system image that is loaded onto the router at reboot time.

flash	Boot from Flash memory.
mop	Configures from a file stored on a DEC MOP server.
rom	Boot from ROM.
tftp	(Optional.) Configures from a file stored on a TFTP server.
<i>filename</i>	Configuration file.
<i>address</i>	(Optional.) IP address of the TFTP server on which the file resides.
<i>mac-address</i>	(Optional.) MAC address of the MOP server on which the file resides.
<i>interface</i>	(Optional.) Interface out which the router should send MOP requests to reach the MOP server. The interface options are async , dialer , Ethernet , serial , and tunnel .

Example

```
boot system opsoft
```

[no] busy-message *hostname d message d*

Creates a “host failed” message that appears when a connection fails.

<i>hostname</i>	Name of the host.
<i>d</i>	Delimiting character. You cannot use the delimiting character in the message.
<i>message</i>	Message text.

[no] chat-script *script-name expect-send...*

Creates a script that will place a call over a modem.

script-name Specifies the name of the chat script.
expect-send... Specifies the content of the chat script.

Example

The following example shows the **chat-script** command being used to create a chat script named t3000.

```
Router# chat-script t3000 ABORT ERROR ABORT BUSY
ABORT "NO ANSWER" "" "AT H" OK "AT DT \T" DIALING \
c TIMEOUT 30 CONNECT \c
```

config-register *value*

Upon system restart, changes software configuration register settings.

value Register number to be set in hexadecimal. Common values: 0xF sets system to boot from Flash; 0x0 turns off Flash boot; 0x1 sets the default switch register contents; 0x2 boots from ROM monitor.

Use with the **boot host**, **boot network**, and **boot system** commands to enable the system to boot from the appropriate location on IGS, Cisco 3000, and Cisco 7000 routers.

Example

```
config-reg 0xF
boot system flash sysimage
```

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 {8 | 7}

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

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

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

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

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

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

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

- dialer-group* Number of a dialer access group identified in any **dialer-group** interface configuration command.
- access-list-number* Access list number specified in any IP or Novell IPX access lists including Novell IPX extended and Service Access Point (SAP) access lists. See the following table for the supported access list types and numbers.

Access List Type	Access List Number Range
Standard IP	1–99
Extended IP	100–199

Examples

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

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

Controls automatic dialing using DDR by protocol.

- dialer-group* Specifies the number of a dialer access group identified in any **dialer access group** interface configuration command.
- protocol-name* Specifies the supported protocol as listed in the following table.
- permit** or **deny** Specifies the permit or deny condition.

Keyword	Protocol
ip	IP

[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.

succeed	Enables without further question.
password	Enables only if the user enters 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**.

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.

Example

```
hostname HAL
```

[no] interface *interface-type interface-number*

[no] interface *interface-type slot/port* (the Cisco 7000)

Configures an interface type and enters interface configuration mode.

System Configuration Commands

[no] **interface** *interface-type interface-number.subinterface-number*
[multipoint | point-to-point]
[no] **interface** *interface-type slot/port.subinterface-number*
[multipoint | point-to-point] (the Cisco 7000)

Configures a subinterface.

<i>interface-type</i>	Specifies the type of interface to be configured. See the following table for a list of interface types.
<i>interface-number</i>	Specifies the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the show interfaces command.
<i>.subinterface-number</i>	Specifies the subinterface number in the range 1 to 4294967293. The <i>interface-number</i> that precedes the period (.) must match the <i>interface-number</i> this subinterface belongs to.
multipoint point-to-point	Specifies a multipoint or point-to-point subinterface. Default is multipoint .
<i>slot</i>	On the Cisco 7000, specifies the backplane slot number; can be 0, 1, 2, 3, or 4 . The slots are numbered from left to right.
<i>port</i>	On the Cisco 7000, specifies the port number of the interface. It can be 0, 1, 2, 3, 4, or 5 depending on the type of interface, as follows: <ul style="list-style-type: none"> • EIP (Ethernet Interface Processor) 0, 1, 2, 3, 4, or 5 • TRIP (Token Ring Interface Processor) 0, 1, 2, or 3 • FIP (FDDI Interface Processor) 0 • HIP (HSSI Interface Processor) 0 • FSIP (Fast Serial Interface Processor) ? Ports on each interface processor are numbered from the top down.

Keyword	Interface Type
async	Auxiliary port line used as an asynchronous interface.
bri	Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI). This interface configuration is propagated to each of the B channels. B channels cannot be individually configured. The interface must be configured with dial-on-demand commands for calls to be placed on that interface.
dialer	Dialer interface.
ethernet	Ethernet IEEE 802.3 interface.
fdi	Fiber Distributed Data Interface (FDDI).
hssi	High-Speed Serial Interface (HSSI).
loopback	Loopback interface. The interface-number is the number of the loopback interface that you want to create or configure. There is no limit on the number of loopback interfaces you can create.
null	Null interface.
serial	Serial interface.
tokenring	Token Ring interface.
tunnel	Tunnel interface. The <i>interface-number</i> is the number of the tunnel interface that you want to create or configure. There is no limit on the number of tunnel interfaces you can create.

Example

```
interface async 1
```


line [**aux** | **console** | **vty**] *line-number* [*ending-line-number*]

Configures a console port line, auxiliary port line, or virtual terminal lines.

aux	(Optional.) Enables the auxiliary RS-232 DTE port. Must be addressed as relative line 0. The auxiliary port can be used for modem support and asynchronous connections.
console	(Optional.) Specifies the console terminal line. The console port is DCE.
vty	(Optional.) Specifies a virtual terminal for remote console access.
<i>line-number</i>	Specifies the relative number of the terminal line (or the first line in a contiguous group) you want to configure when the line type is specified. Numbering begins with zero.
<i>ending-line-number</i>	(Optional.) Specifies the relative number of the last line in a contiguous group you want to configure. If you omit the keyword, then <i>line-number</i> and <i>ending-line-number</i> are absolute rather than relative line numbers.

Example

```
line vty 0 4
```

[no] lockable

Enables the EXEC command **lock**.

[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**.

The argument *level* is one of the following keywords:

Keyword	Description
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.

Example

```
logging console emergencies
```

[no] logging *host*

Identifies a syslog server host to receive logging messages.

host Name or Internet address of the host.

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*. Default is **Debugging**.

level One of the keywords listed for the **logging console** command.

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*. Default is **informational**.

level One of the keywords described for the **logging console** command.

Example

```
logging trap errors
```

[no] login-string *hostname d message [%secp] [%secw] [%b] d*

Defines a string of characters that the router sends to a host after a successful Telnet connection. This command applies only to rlogin and Telnet sessions.

<i>hostname</i>	Specifies the name of the host.
<i>d</i>	Sets a delimiting character of your choice—a pound sign (#) for example. You cannot use the delimiting character in the busy message.
<i>message</i>	Specifies the login string.
%secp	(Optional.) Sets a pause in seconds. To insert pauses into the login string, embed a percent sign (%) followed by the number of seconds to pause and the letter “p.”
%secw	(Optional.) Prevents users from issuing commands or keystrokes during a pause.
%b	(Optional.) Sends a Break character.

[no] modem answer-timeout *seconds*

Sets the amount of time that the router waits for CTS after raising DTR in response to RING.

<i>seconds</i>	Specifies the timeout interval in seconds.
----------------	--

[no] modem callin

Supports dial-in modems that use DTR to control the off-hook status of the modem. In response to RING, the modem raises the DTR signal, which answers the modem. At the end of the session, the router lowers DTR, which disconnects the modem.

[no] modem callout

Configures a line for reverse connections.

[no] modem chat-script *regular-expression*

Sets a regular expression for a script on a modem line.

<i>regular-expression</i>	Specifies the set of modem scripts that might be executed. The first script that matches the argument <i>regular-expression</i> will be used.
---------------------------	---

Example

```
! Some lines have telebit modems
line 1 6
modem chat-script telebit.*
! Some lines have US robotics modems
line 7 12
modem chat-script usr.*
```

[no] modem cts-required

Configures a line to require Clear To Send (CTS).

[no] modem dtr-active

Configures a line to leave DTR low unless the line has an active incoming connection or an EXEC process.

[no] modem in-out

Configures a line for both incoming and outgoing calls.

[no] modem ri-is-cd

Configures a line for a high-speed modem.

[no] mop device-code { cisco | ds200 }

Identifies the type of device sending MOP sysid and request messages.

cisco	Denotes a Cisco device code. Default.
ds200	Denotes a DEC server 200 device code.

[no] mop retransmit-timer *seconds*

Configures the length of time the router waits before retransmitting boot requests to a MOP server.

retransmit-timer	Length of time the router waits before retransmitting MOP boot requests.
<i>seconds</i>	Time the router waits before retransmitting a message. A number from 1 to 20.

[no] mop retries *count*

Configures the number of times a router will retransmit boot requests to a MOP server.

retries	Number of times a router retransmits MOP boot requests.
<i>count</i>	Number of times a router retransmits MOP boot requests. A number from 3 to 24.

[no] padding *ASCII-number count*

Sets the padding on a specific output character.

<i>ASCII-number</i>	ASCII decimal representation of the character.
<i>count</i>	Number of NULL bytes sent after that character, up to 255 padding characters.

parity { **none** | **even** | **odd** | **space** | **mark** }

Defines generation of a parity bit.

none	No parity.
even	Even parity.
odd	Odd parity.
space	Space parity.
mark	Mark parity.

[no] password *password*

Specifies a password on a line.

<i>password</i>	Case-sensitive character string of up to 80 characters that specifies the line password. The first character cannot be a number.
-----------------	--

[no] private

Saves user EXEC command changes between terminal sessions.

[no] refuse-message *d message d*

Defines a line-in-use message.

<i>d</i>	Delimiting character of your choice—a pound sign (#) for example. You cannot use the delimiting character in the message.
<i>message</i>	Message text.

[no] rotary *group*

Defines a group of lines consisting of one of more virtual terminal lines.

<i>group</i>	Integer between 1 and 100 that you choose to identify the rotary group.
--------------	---

rxspeed *bps*

Sets the terminal baud rate receive (from terminal) speed.

bps Baud rate in bits per second (bps). The default is 9600.

[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.

Example

```
scheduler-interval 750
```

[no] service config

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

[no] service decimal-tty

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

[no] service password-encryption

Enables encrypted passwords.

[no] service timestamps [*type* **uptime**] or
[no] service timestamps *type* **datetime** [**msec**] [**localtime**]
[show-timezone]

Configures the system to timestamp debugging or logging messages.

<i>type</i>	(Optional.) Type of message to timestamp: debug or log .
uptime	Timestamp with time since the system was rebooted.
datetime	Timestamp with the date and time.
msec	(Optional.) Add milliseconds to the date and time.
localtime	(Optional.) Timestamp relative to the local time zone.
show-timezone	(Optional.) Include the time zone name in the timestamp.

Example

```
no service config
```

[no] service linenumber

Provides service line number information after the EXEC or incoming banner.

[no] session-limit *session-number*

Sets the maximum number of terminal sessions per line.

session-number Specifies the maximum number of sessions.

[no] session-timeout *minutes* [**output**]

Sets the interval for closing the connection when there is no input or output traffic.

minutes Specifies the time interval in minutes.

output (Optional.) Specifies that when traffic is sent to an asynchronous line from the router (within the specified interval), the connection is retained.

[no] smt-queue-threshold *number*

Sets or removes the maximum number of unprocessed FDDI station management (SMT) frames that the router will hold for processing. The **no** form restores the default, which is the number of installed FDDI interfaces.

number Positive integer.

Example

```
smt-queue-threshold 2
```

no snmp-server

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 to 99.

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.

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

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.

<i>ip-address</i>	Name or Internet address of the host.
<i>community-string</i>	Your community string, similar to a password, that you set with the snmp-server community command.

The keywords **snmp** or **tty** specify the trap type.

snmp	(Optional.) Sends all SNMP-type trap messages and starts the Cisco-specific reload trap message.
tty	(Optional.) Includes TCP connection trap messages.

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 to 8192. Default is 484.

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.

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 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.

System Configuration Commands

Example

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

speed *bps*

Sets the terminal transmission rate. The command sets both the transmit (to terminal) and receive (from terminal) speeds.

bps Transmission rate in bits per second (bps).

[no] start-character *ASCII-number*

Sets the flow control start character. The command defines the character that signals the start of data transmission when software flow control is in effect.

ASCII-number ASCII decimal representation of the start character.

stopbits { **1** | **1.5** | **2** }

Sets the number of the stop bits transmitted per byte.

1 One stop bit.
1.5 One and one-half stop bits.
2 Two stop bits.

[no] stop-character *ASCII-number*

Sets the flow control stop character.

ASCII-number ASCII decimal representation of the stop character.

[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.

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 Enter 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.

Example

```
tacacs-server host host1
```

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

Causes the network server to request the privileged password as verification, or forces 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	Enter 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.

<i>retries</i>	Retransmit count.
----------------	-------------------

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.

Example

```
tacacs-server timeout 10
```

telnet break-on-ip | refuse-negotiations | speed *default-speed* *maximum-speed* | sync-on-break | transparent

Configures the Telnet capabilities of the router.

break-on-ip	Causes the system to generate a hardware Break signal on the RS-232 line that is associated with a reverse Telnet connection. Occurs when a Telnet Interrupt-Process (IP) command is received on that connection can be used to control the translation of Telnet IP commands into X.25 Break indications.
refuse-negotiations	Sets a line using Telnet to refuse to negotiate full duplex, remote echo options on incoming connections. Used on reverse Telnet connections to allow the router to refuse these requests from the other end.
speed <i>default-speed</i>	Negotiates speeds on reverse Telnet lines. Used only with the speed keyword. Sets the line speed that the router will use if the device on the other end of the connection has not specified a speed.

<i>maximum-speed</i>	Used only with the speed keyword. Specifies the maximum speed the device on the port will use.
sync-on-break	Causes a reverse Telnet line to send a Telnet Synchronize signal when it receives a Telnet Break signal. This option is used very rarely to ensure the ordering of break reception with respect to data characters sent after the break.
transparent	Used to send a Return (CR) as a CR followed by a NULL instead of a CR followed by a Line Feed (LF) on Telnet lines.

[no] terminal-type *terminal-name*

Specifies the type of terminal connected to a line.

terminal-name Terminal name and type.

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

Specifies or removes TFTP server operation for a device.

filename Name of the network server ROM file.

ip-access-list (Optional.) IP access list number.

Example

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

[no] transport input [mop | telnet | none]

Allows the system administrator to define which protocols to use to connect to a specific line of the communication server.

- mop** Selects the MOP protocol.
- telnet** (Optional.) Specifies all types of incoming TCP/IP connections.
- none** (Optional.) Prevents any protocol selection on the line. This makes the port unusable by incoming connections.

[no] transport output [telnet | none]

Determines the protocols that can be used for outgoing connections from a line.

- telnet** (Optional.) Selects the TCP/IP Telnet protocol. It allows a user at one site to establish a TCP connection to a login server at another site.
- none** (Optional.) Prevents any protocol selection on the line. The system normally assumes that any unrecognized command is a host name. If the protocol is set to none, the system no longer makes that assumption. No connection will be attempted if the command is not recognized.

[no] transport preferred [telnet | none]

Specifies the preferred protocol when a command does not specify one.

- telnet** (Optional.) Selects the TCP/IP Telnet protocol. It allows a user at one site to establish a TCP connection to a login server at another site.
- none** (Optional.) Prevents protocol selection on the line. The system normally assumes that unrecognized commands are host names. If the protocol is set to **none**, the system no longer makes that assumption. No connection is attempted if the command is not recognized.

txspeed *bps*

Sets the terminal transmit baud rate (to terminal).

bps Baud rate in bits per second (bps).

username *name* [**nopassword** | **password** *encryptiontype-password*]

username *name* **password** *secret*

username *name* [**accesslist** *number*]

username *name* [**autocommand** *command*]

username *name* [**noescape**] [**nohangup**]

Implements a user name-based authentication system for networks that cannot support a TACACS service. Also defines user names that get special treatment.

name Name of either a local communication server or a remote device.

nopassword (Optional.) No password is required for this user to log in.

password Specifies a possibly encrypted password for this username.

*encryptiontype-
password* (Optional.) Single-digit number. Currently defined encryption types are 0, which means no encryption, and 7, which specifies a Cisco-defined encryption algorithm.

secret Specifies the secret (a special password) for the local communication server or remote device. The secret can consist of any string of up to 11 printable ASCII characters.

accesslist
number (Optional.) Specifies an outgoing access list that overrides the access list specified in the **access class** line configuration command.

autocommand <i>command</i>	(Optional.) Causes the command specified to be issued automatically after the user logs in.
noescape	(Optional.) Prevents user from having an escape character with which to escape from the host system.
nohangup	(Optional.) Prevents the network server from disconnecting the user after an automatic command.

Examples

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

The following example configuration enables CHAP on interface serial 0. It also defines a password for the local server, Adam, and a remote server, Eve.

```
hostname Adam
interface serial 0
encapsulation ppp
ppp authentication chap
username Eve password theirsystem
```

When you look at your configuration file, the passwords will be encrypted and the display will look similar to the following:

```
hostname Adam
interface serial 0
encapsulation ppp
ppp authentication chap
username Eve password 7 121F0A18
```

[no] vacant-message [*d message d*]

Displays an idle terminal message. The command enables the banner to be displayed on the screen of an idle terminal. The **vacant-message** command without any arguments restores the default message.

d (Optional.) A delimiting character of your choice—a pound sign (#), for example. You cannot use the delimiting character in the banner message.

message (Optional.) Vacant terminal message.

width *characters*

Sets the terminal screen width. This command sets the number of character columns displayed on the attached terminal.

characters Number of character columns on the terminal.

System Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] ip rarp-server *address*

Permits the router to act as a Reverse Address Resolution Protocol (RARP) server.

address IP address which is to be provided in the source protocol address field of the RARP response packet. Normally, this is set to whatever address you configure as the primary address for the interface.

[no] microcode *interface-type* [**flash** | **rom**] [*filename*]

Specifies the location of the microcode you want to download from Flash memory into the writable control store (WCS) on a Cisco 7000.

interface-type One of the following interface processor names: **fip**, **hip**, **trip**, **eip**, or **sp**.

flash | **rom** (Optional.) If the **flash** keyword is specified, a filename argument is required, unless you are using the **no microcode interface-type flash** command.

If the **rom** keyword is specified, no further arguments are necessary.

filename (Optional.) Filename of the microcode in Flash memory that you want to download. This argument is only used with the **flash** keyword.

microcode reload

Signals the Cisco 7000 that all microcode configuration commands have been entered and the processor cards should be reloaded.

Line Configuration Commands

Enter the following commands from within line configuration mode.

access-class *list* {**in** | **out**}

Applies a basic IP access list to a line.

list Identifies a specific standard IP access list (1 - 99).

in Indicates an incoming connection, such as a virtual terminal connection.

out Indicates an outgoing Telnet connection.

activation-character *ASCII-number*

Sets the activation character. This command defines the character you type at a vacant terminal to begin a terminal session.

ASCII-number ASCII decimal representation of the activation character.

[no] async dynamic address

Specifies dynamic asynchronous addressing.

[no] async mode interactive

Enables the **ppp** and **slip** EXEC commands. The **no** form prevents users from implementing SLIP and PPP at the EXEC level.

[no] autobaud

Sets the line for automatic baud detection.

autocommand *command*

Configures the router to automatically execute a command or list of commands when a user connects to a particular line.

command Any appropriate EXEC command, including the host name and any switches that occur with the EXEC command.

autohangup

Configures automatic line disconnect. This command causes the EXEC to issue the **exit** command when the last connection closes.

banner exec *d message d*

Displays a message on terminals with an interactive EXEC. This command specifies the message to be displayed when an EXEC process is created (line activated, or incoming connection to VTY).

d Delimiting character of your choice—a pound sign (#), for example. You cannot use the delimiting character in the banner message.

message Message text.

banner incoming *d message d*

Displays a message when you have an incoming connection to a line from a host on the network. This line should *not* display the EXEC or message-of-the-day banners when an EXEC is created.

d Delimiting character of your choice—a pound sign (#), for example. You cannot use the delimiting character in the banner message.

message Message text.

databits {5** | **6** | **7** | **8**}**

Sets the number of data bits per character that are interpreted and generated by hardware.

5 Five data bits per character.

6 Six data bits per character.

7 Seven data bits per character.

8 Eight data bits per character.

data-character-bits {7 | 8}

Sets the number of data bits per character that are interpreted and generated by software.

- 7 Seven data bits per character.
- 8 Eight data bits per character.

[no] disconnect-character *ASCII-number*

Defines a character you enter to end a terminal session.

ASCII-number ASCII decimal representation of the session disconnect character.

[no] dispatch-character *ASCII-number1* [*ASCII-number2* . . . *ASCII-number*]

Defines a character that causes a packet to be sent.

ASCII-number ASCII decimal representation of the character, such as 13 for line-at-a-time transmissions.

[no] dispatch-timeout *milliseconds*

Sets the character dispatch timer.

milliseconds The number of milliseconds the router waits after putting the first character into a packet buffer before sending the packet.

[no] editing

Enables enhanced editing mode for a particular line.

[no] escape-character *ASCII-number*

Defines a system escape character on the specified line. Default escape character: **Break**.

ASCII-number ASCII decimal representation of the character or a control sequence (such as Ctrl-E).

Example

```
escape-character 13
```

[no] exec

Permits an EXEC process on a line.

[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 is 10 minutes.
seconds (Optional.) Number of seconds; an interval of zero specifies no timeouts.

Example

```
exec-timeout 15 30
```

[no] flowcontrol { **none** | **software** [**in** | **out**] | **hardware** }

Sets the method of data flow control between the terminal or other serial device and the router.

none Turns off flow control.
software Sets software flow control. The optional keyword **in** causes the router to listen to flow control from the attached device; **out** causes the router to send flow control information to the attached device.
hardware Sets hardware flow control. See the hardware reference manual for your router product.

[no] hold-character *ASCII-number*

Defines the local hold character used to pause output to the terminal screen

ASCII-number Either the ASCII decimal representation or a control sequence (such as Ctrl-P).

[no] history size *number-of-lines*

Changes the command history buffer size for a particular line.

number-of-lines Number of command lines that the system will record in its history buffer (0 through 256).

[no] length *screen-length*

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

screen-length Number of lines on the screen.

Example

```
length 32
```

[no] location *text*

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

text Desired description.

Example

```
location In the hall
```

[no] login [**local** | **tacacs**]

Enables or disables password checking at login time.

local (Optional.) Selects local password checking. Authentication is based on the username specified with the **username** global configuration command.

tacacs (Optional.) Selects the TACACS-style user ID and password-checking mechanism.

Examples

```
line vty 4
password letmein
login
```

```
line 0
password mypassword
login tacacs
```

[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.

<i>decimal-number</i>	ASCII decimal representation of the character.
<i>count</i>	Number of NULL bytes sent after the character.

Example

```
padding 13 25
```

[no] password *password*

Specifies a password.

<i>password</i>	The password you enter for line access. It can contain up to 80 alphanumeric characters, including spaces.
-----------------	--

Example

```
password yourpassword
```

special-character-bits { 7 | 8 }

Sets a mode that compares typed-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** form suppresses a banner message.

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

Example

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

Interface and Media Configuration Commands

Interface and media configuration commands consist of the following:

- Interface configuration commands
- EXEC interface management commands
- Interface management show commands
- Frame Relay interface configuration commands
- Frame Relay show commands
- SMDS global configuration commands
- SMDS interface configuration commands
- SMDS show commands
- X.25 EXEC commands
- X.25 global configuration commands
- LAPB and X.25 interface configuration commands
- X.25 show commands

Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] async default ip address *address*

Assigns the interface address that the end host must use to connect to the router via PPP or SLIP.

ip address Address of the client interface.

[no] async dynamic routing

Implements asynchronous routing on an interface.

[no] async mode dedicated

Places a line into network mode using SLIP or PPP encapsulation.

atm-dxi map *protocol protocol-address vpi vci* [**broadcast**]

Maps a given VPI and VCI to a frame relay DLCI.

<i>protocol</i>	Specifies a protocol, including the following: apollo, appletalk, bridge, cns, decnet, ip, novell, vines, xns.
<i>protocol-address</i>	Specifies the protocol-specific address.
<i>vpi</i>	Virtual path identifier (VPI) within an ATM cell. The range is 1 to 63.
<i>vci</i>	Virtual circuit identifier (VCI). The range is 1 to 63.
broadcast	(Optional.) Address to which broadcasts should be forwarded.

[no] backup delay {*enable-delay* | **never**} {*disable-delay* | **never**}

Defines how much time should elapse before a secondary line status changes after a primary line status has changed.

<i>enable-delay</i>	Delay in seconds after the primary line goes down before the secondary line is activated. The default is no delay. As soon as the primary line fails, the secondary line is brought up.
never	Prevents the secondary line from being activated when the primary line goes down or prevents the secondary line from being deactivated once the primary line has been brought back up.
<i>disable-delay</i>	Delay in seconds after the primary line is brought up before the secondary line is deactivated.

Example

```
interface serial 0
backup delay 0 10
```

[no] backup interface *interface-name*

Defines the serial interface as a secondary line or dial backup line. The serial interface can be designated as the backup interface for only one interface.

interface-name Serial port to be set as the secondary interface line or the dial backup line.

Example

```
interface async
backup interface serial 1
```

[no] backup load {*enable-threshold* | **never**} {*disable-threshold* | **never**}

Sets the traffic load thresholds. The **no** form restores the default, which is no backup loads.

enable-threshold Percentage of the primary line's available bandwidth that can be used before the secondary line is enabled.

never Prevents the secondary line from being activated because of traffic load or prevents the secondary line from being deactivated because of traffic load.

disable-threshold Percentage of the primary line's bandwidth that must be available in order for the secondary line to be deactivated.

Example

```
interface serial 0
backup load 60 5
```

[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.

Example

```
bandwidth 45045
```

[no] clockrate *bps*

Sets the clock rate on the serial interface of the SCI and MCI cards. The **no** form removes the command from the configuration.

bps Clock rate in bits per second. Legal values: 1200, 2400, 4800, 9600, 19200, 38400, 56000, and 64000. With high-speed applique: 72000, 125000, 148000, 500000, 800000, 1000000, 1300000, 2000000, and 4000000.

Example

```
clockrate 64000
```

[no] crc *size*

Sets the length of the cyclic redundancy check (CRC) on a Fast Serial Interface Processor (FSIP) of a Cisco 7000. To set the CRC length to 16 bits, use the **no** form of the command.

size CRC size (16 or 32 bits).

Example

In this example, the 32-bit CRC is enabled on serial interface 3/0:

```
interface serial 3/0
crc 32
```

[no] custom-queue-list *list*

Assigns a queue list to an interface.

list Number of the custom queue list you want to assign to the interface. An integer from 1 to 10.

[no] dce-terminal-timing-enable

Causes the DCE to use SCTE from the DTE when the serial Network Interface Module on a Cisco 4000 is operating as a DCE and the DTE provides terminal timing (SCTE or TT). The **no** form causes the DCE to use its own clock instead of SCTE from the DTE.

[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.

Example

```
delay 20
```

[no] description *string*

Permits you to add a description to an interface configuration.

string Comment or a description to help you remember what is attached to this interface.

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 after a call has completed or failed. The **no** form restores the default of 15 seconds.

number-of-seconds Specifies in seconds the amount of time that the router waits before the next call can occur on the specific interface. Acceptable values are positive, nonzero integers. The default is 15 seconds.

Example

```
interface async 1
dialer enable-timeout 10
```

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

Specifies the amount of time that a line for which there is contention will stay idle before the line is disconnected and the competing call is placed. The **no** form restores the default of 20 seconds.

number-of-seconds Specifies in seconds how much idle time must occur on an interface before the line is disconnected. Acceptable values are positive, nonzero integers.

Example

The following example specifies a fast idle timeout of 35 seconds on interface async 1:

```
interface async 1
dialer fast-idle 35
```

[no] dialer-group *group-number*

Specifies the number of a dialer access group to which a specific interface is assigned. The **no** form removes an interface from the specified dialer-group.

group-number Specifies the number of the dialer access group to which the specific interface belongs. This access group is defined using the **dialer-list** command. Acceptable values are nonzero, positive integers between 1 and 10.

Example

```
interface async 1
dialer-group 1
```

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

Specifies the idle time before the line is disconnected. The **no** form restores the default of 120 seconds.

number-of-seconds Specifies in seconds how much idle time must occur on an interface before the line is disconnected. Acceptable values are positive, nonzero integers.

Example

The following example specifies an idle timeout of 3 minutes (180 seconds) on interface async 1:

```
interface async 1
dialer idle-timeout 180
```

[no] dialer in-band [no-parity | odd-parity]

Specifies that DDR is to be supported. The **dialer in-band** command specifies that chat scripts will be used on the auxiliary port and V.25bis will be used on synchronous interfaces.

- no-parity** (Optional.) Specifies that no parity is applied to the dialer string that is sent out to the modem on synchronous interfaces.
- odd-parity** (Optional.) Specifies the dialed number will have odd parity (7-bit ASCII characters with the eighth bit the parity bit) on synchronous interfaces.

Example

The following example specifies DDR for async 1:

```
interface async 1
dialer in-band
```

[no] dialer load-threshold *load*

Configures bandwidth on demand by setting the maximum load before the dialer places another call to a destination.

- load* Specifies the interface load beyond which the dialer will initiate another call to the destination. This argument is a number between 1 and 255.

Example

```
interface dialer 5
dialer load-threshold 200
encapsulation ppp
authentication chap
dialer in-band
ip address 131.108.2.1
dialer map ip 131.108.2.5 name YYY 1415553434
dialer map ip 131.126.2.9 name ZZZ
```

[no] dialer map *protocol next-hop-address* [**modem-script** *modem-regexp*] [**system-script** *system-regexp*] *dial-string*

Permits you to place a call to a single site on an asynchronous line for which a modem script has not been assigned and/or a system script must be specified, and to multiple sites on a single line, multiple lines or a dialer rotary group.

<i>protocol</i>	Specifies the name of the protocol.
<i>next-hop-address</i>	Specifies the protocol address used to match against addresses to which packets are destined.
modem-script	(Optional.) Specifies the modem script to be used for the connection (for asynchronous interfaces).
<i>modem-regexp</i>	Regular expression to which a modem script will be matched for asynchronous interfaces).
system-script	(Optional.) Specifies the system script to be used for the connection (for asynchronous interfaces).
<i>system-regexp</i>	Regular expression to which a system script will be matched for asynchronous interfaces).
<i>dial-string</i>	Specifies the telephone number sent to the dialing device when it sees packets with the specified <i>next-hop-address</i> that matches the access lists defined.

[no] dialer map *protocol next-hop-address* [**modem-script** *modem-regexp*] [**system-script** *system-regexp*] **name** *hostname dial-string*

Configures a serial interface to call multiple sites and to authenticate calls from multiple sites.

<i>protocol</i>	Specifies the name of the protocol.
<i>next-hop-address</i>	Specifies the protocol address used to match against addresses to which packets are destined.
modem-script	(Optional.) Specifies the modem script to be used for the connection (for asynchronous interfaces).
<i>modem-regexp</i>	Regular expression to which a modem script will be matched for asynchronous interfaces).
system-script	Specifies the system script to be used for the connection (for asynchronous interfaces).
<i>system-regexp</i>	Regular expression to which a system script will be matched for async. interfaces).
name	(Optional.) Indicates a remote system with which the local router communicates.
<i>hostname</i>	Specifies the name of the remote device (usually the host name).
<i>dial-string</i>	Specifies the telephone number sent to the DCE dialing device when it sees packets with the specified <i>next-hop-address</i> that matches the access lists defined.

Example

```
interface async 1
dialer map ip 131.108.2.5 name ZZZ 14155553434
```

Interface and Media Configuration Commands

[no] dialer map *protocol* [**speed 56** | **speed 64**] *next-hop-address*
name *hostname*

Configures a dialer rotary group to receive and take advantage of caller identification using CHAP.

<i>protocol</i>	Specifies the name of the protocol.
speed 56	(Optional.) Specifies the call is over a 56 kilobits per second (kbps) line.
speed 64	(Optional.) Specifies the call is over a 64 kbps line.
<i>next-hop-address</i>	Specifies the protocol address used to match against addresses to which packets are destined.
name	Indicates a remote system with which the local router communicates.
<i>hostname</i>	Specifies the name of the remote device (usually the host name).

Example

```
interface async 1
encapsulation ppp
ppp authentication chap
dialer map ip 131.108.2.5 name YYY
```

[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 only. The **no** form deletes a particular dialer map entry.

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

Example

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

[no] dialer priority *n*

Sets the priority of an interface in a dialer rotary group.

<i>n</i>	Specifies the priority of an interface in a dialer rotary group; the lowest number indicates the highest priority. A number from 0 to 255.
----------	--

Example

```
interface async 3
dialer priority 5
```

dialer rotary-group *number*

Includes an interface in a dialer rotary group.

number The number of the dialer interface in whose rotary you want this interface included. An integer that you select that indicates the dialer rotary group; defined by the **interface dialer** command. A number from 0 to 255.

Example

The following example places async interfaces 1 and 2 into dialer rotary group 1, defined by the **interface dialer 1** command.

```
interface async 1
dialer rotary-group 1
interface async 2
dialer rotary-group 1
```

[no] dialer string *dial-string*

Specifies the string (telephone number) to be called for interfaces calling a single site.

dial-string Character string to be passed to the DCE.

Example

The following example specifies a DDR telephone number to be tone dialed on interface async 1 using the **dialer string** command.

```
interface async 1
dialer string T14085553434
```

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

Specifies how long the router will wait for a carrier. On asynchronous interfaces this command sets the total time allowed for the chat script to run. The **no** form restores the default of 30 seconds.

<i>number-of-seconds</i>	Number of seconds to wait for the carrier to come up when a call is placed. Acceptable values are positive, nonzero integers.
--------------------------	---

Example

The following example specifies a carrier wait time of 45 seconds on interface async 1:

```
interface async 1
dialer wait-for-carrier-timeout 45
```

down-when-looped

Configures an interface to tell the system it is down when loopback is detected.

[no] dte-invert-txc

Inverts the TXC clock signal from the DCE that is used by the DTE to transmit data on the Cisco 4000 serial Network Interface Module.

[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.

<i>encapsulation-type</i>	See the following table for a list of supported encapsulation types.
---------------------------	--

Keyword	Encapsulation Type
arpa	This encapsulation uses a 16-bit protocol type code.
atm-dxi	Asynchronous Transfer Mode-Data Exchange Interface. Encapsulation that allows a router to interface with an ATM DSU in order to interface with ATM networks (for serial interfaces).
bfex25	Blacker Front End Encryption X.25 operation (for serial interface).
ddnx25-dce	DDN X.25 DCE operation (for serial interface).
ddnx25	DDN X.25 DTE operation (for serial interface).
frame-relay	Frame Relay (for serial interface).
hdlc	High-Level Data Link Control (HDLC) protocol for serial interface. This encapsulation method provides the synchronous framing and error detection functions of HDLC without windowing or retransmission.
sap	IEEE 802.3 encapsulation. In this encapsulation, the type code becomes the frame length for the IEEE 802.2 LLC encapsulation (destination and source Service Access Points and a control byte).
lapb-dce	X.25 LAPB DCE operation (for serial interface).
lapb	X.25 LAPB DTE operation (for serial interface).
multi-lapb-dce	X.25 LAPB multiprotocol DCE operation (for serial interface).
multi-lapb	X.25 LAPB multiprotocol DTE operation (for serial interface).
ppp	Point-to-Point Protocol (PPP) (for serial interface).
sdhc-primary	IBM serial SNA (for serial interface).
sdhc-secondary	IBM serial SNA (for serial interface).
smds	Switched Multimegabit Data Services (SMDS) (for serial interface).
snap	IEEE 802.2 Ethernet media. This encapsulation is specified in RFC 1042 and allows Ethernet protocols to run on IEEE 802.2 media.

Keyword	Encapsulation Type
stun	Cisco serial tunnel (STUN) protocol functions (for serial interface).
x25-dce	X.25 DCE operation (for serial interface).
x25	X.25 DTE operation (for serial interface).

error-threshold *milliseconds*

Sets the frequency at which the error recount will be set. This protects against packet overload and resultant recount errors on the MCI interface cards. Default is 1000 milliseconds.

milliseconds Frequency in milliseconds.

Example

```
error-threshold 10000
```

[no] fddi burst-count *number*

Allows the FCI card to preallocate buffers to handle bursty FDDI traffic (for example, NFS bursty traffic).

number Number of preallocated buffers in the range 1 to 10.

[no] fddi c-min *microseconds*

Sets the c-min timer on the PCM.

microseconds Sets the timer value in microseconds.

[no] fddi cmt-plus

Controls whether the connection management (CMT) functions onboard the CSC-2/FCIT card are on or off. The default is on. A typical use is when problems occur bringing up the ring while working with new FDDI equipment.

fdi cmt-signal-bits *signal-bits* {**phy-a** | **phy-b**}

Controls the information transmitted during the FDDI CMT signaling phase.

<i>signal-bits</i>	Hexadecimal number preceded by "0x."
phy-a or phy-b	Physical Sublayer: Physical A or Physical B station.

Example

```
fdi cmt-signal-bits 0x208 phy-a
```

[no] fdi duplicate-address-check

Turns on the duplicate address detection capability on the FDDI.

[no] fdi encapsulate

Allows the CSC-FCIT card to interoperate with earlier versions of the CSC-FCI card when performing bridging functions on the same ring. The **no** form returns the CSC-FCIT card to its transparent, nonencapsulating mode.

[no] fdi if-cmt

Controls whether or not the FDDI connection management (CMT) functions are on or off. Default is on. Use the **no** form to disable the function.

[no] fdi smt-frames

Enables the SMT frame processing capability on the FDDI.

[no] fddi t-out *milliseconds*

Sets the t-out timer in the PCM.

milliseconds Specifies the timeout timer.

[no] fddi tb-min *milliseconds*

Sets the TB-min timer in the PCM.

milliseconds Specifies the tb-min timer.

fddi tl-min-time *microseconds*

Controls the FDDI TL_MIN time, which is the minimum time to transmit a Physical Sublayer or PHY line state before advancing to the next Physical Connection Management or PCM state.

microseconds Usually 30; some implementations of the FDDI standard need more than 30 microseconds to sense a signal.

Example

```
fddi tl-min-time 30
```

fddi token-rotation-time *microseconds*

Controls ring scheduling during normal operation, and detects and recovers from serious ring error situations. Default is 5000 microseconds.

microseconds Number of microseconds in the token rotation time (TRT).

Example

```
fddi token-rotation-time 2500
```


fddi valid-transmission-time *microseconds*

Sets the transmission valid timer (TVX) interval. Default is 2500 microseconds.

microseconds Number of microseconds.

Example

```
fddi valid-transmission-time 1250
```

[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.

Example

```
hold-queue 40 in
```

[no] hssi external-loopback-request

Enables or disables an external loopback request on HSSI from the CSU/DSU.

[no] invert-transmit-clock

Delays between the SCTE clock and data transmission indicate that the transmit clock signal might not be appropriate for the interface rate and length of cable being used. Different ends of the wire may have variances that differ slightly. Invert the clock signal to compensate for these factors, using the **invert-transmit-clock** interface configuration command. This command applies to a Cisco 7000.

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

Sets an IP address for an interface.

<i>ip-address</i>	IP address.
<i>net-mask</i>	Subnet mask for the associated network.
secondary	(Optional.) Include this keyword for all IP addresses other than the first.

Examples

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

[no] isdn spid1 *spid-number* [*ldn*]

Interface configuration command that defines at the router the SPID number that has been assigned by the ISDN service provider for the B1 channel. The **no** form disables the specified SPID, thereby preventing access to the switch. If you include the LDN in the no form of this command, the access to the switch is permitted, but the other B channel may not be able to receive incoming calls.

<i>spid-number</i>	Number identifying the service to which you have subscribed. This value is assigned by the ISDN service provider and is usually a ten-digit telephone number with some extra digits.
<i>ldn</i>	(Optional.) Local directory number. This is a seven-digit number also assigned by the service provider.

Example

The following example defines, on the router, a SPID and LDN for the B1 channel:

```
isdn spid1 415555121301 5551215
```

[no] isdn spid2 *spid-number* [*ldn*]

Interface configuration command that defines at the router the SPID number that has been assigned by the ISDN service provider for the B2 channel. The **no** form disables the specified SPID, thereby preventing access to the switch. If you include the LDN in the **no** form of this command, the access to the switch is permitted, but the other B channel may not be able to receive incoming calls.

spid-number Number identifying the service to which you have subscribed. This value is assigned by the ISDN service provider and is usually a ten-digit telephone number with some extra digits.

ldn (Optional.) Local directory number. This is a seven-digit number also assigned by the service provider.

Example

The following example defines, on the router, a SPID and LDN for the B2 channel:

```
isdn spid2 415555121202 5551214
```

isdn switch-type *switch-type*

Configures a specific Integrated Services Digital Network (ISDN) central office switch.

switch-type Central office switch type; see the following table for a list of supported switches.

Keyword	Switch Type
basic-1tr6	German switch standard
basic-5ess	ATT 5ESS
basic-dms100	NT DMS-100
basic-net3	Switch type for NET3 in UK and Europe

Keyword	Switch Type
ntt	NTT ISDN
vn2	French VN2 standard
vn3	French VN3 standard

Example

```
isdn switch-type basic-5ess
```

[no] isdn tei [first-call | powerup]

Global configuration command that configures when ISDN terminal endpoint identifier (TEI) negotiation should occur. The **no** form restores the default.

first-call (Optional.) ISDN TEI negotiation should occur when the first ISDN call is placed or received.

powerup (Optional.) ISDN TEI negotiation should occur when the router is powered on.

Example

The following example configures the router to negotiate TEI when the first ISDN call is placed or received:

```
isdn tei first-call
```

[no] keepalive [*seconds*]

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

seconds (Optional.) Number of seconds after which the keepalive timer is activated.

Example

```
keepalive 3
```

[no] loopback

Achieves the following effect, depending on the interface:

HSSI	Configures a two-way internal and external loopback loop on the HSA applique of the specified interface.
MCI and SCI serial cards	Loops the packets through the CSU/DSU to configure a CSU loop, when the device supports this feature. This is similar to the loopback line command on the HSSI.
MCI and MEC Ethernet cards	Loops the packets at the interface within the router.
CSC-R16 card	Loops the packets at the interface within the router.

The **no** form disables the loopback test.

[no] loopback applique

For use with HSSI connections only. Configures an internal loop on the HSSI. This command is useful for sending pings to yourself to check functionality of the applique. Equivalent to the **loopback** command for HSSI.

[no] loopback dte

For use with HSSI connections only. Checks connectivity between the router and the CSU/DSU by looping packets from the router to the CSU/DSU and back.

[no] loopback line

For use with HSSI connections only. Tests functionality of the CSU/DSU by looping the packets through the CSU/DSU to configure a CSU loop.

[no] loopback remote

For use with HSSI connections only. Loops the packets through the CSU/DSU and over the DS3 link to the remote CSU/DSU.

[no] media-type [aui | 10baset]

Selects 15-pin (**aui**) or RJ45 10BaseT physical connection (**10baset**) on the Cisco 4000 Network Interface Module.

[no] mop enabled

Enables an interface to support the Maintenance Operation Protocol (MOP).

[no] mop sysid

Enables an interface to send out period Maintenance Operation Protocol (MOP) system identification messages.

[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.

Example

```
mtu 576
```

[no] nrzi-encoding

Enables nonreturn to zero inverted (NRZI) line coding format.

[no] ntp broadcast [*version number*]

Specifies that a specific interface should send Network Time Protocol (NTP) broadcast packets.

version number (Optional.) Number from 1 to 3 indicating the NTP version.

[no] ntp broadcast client

Allows the system to receive NTP broadcast packets on an interface.

[no] ntp disable

Prevents an interface from receiving NTP packets.

[no] ppp authentication chap

Enables Challenge Handshake Authentication Protocol (CHAP) on a serial interface.

Example

```
interface async 4
ppp authentication chap
```

[no] ppp quality *percentage*

Enables Link Quality Monitoring (LQM) on a serial interface.

percentage Specifies the link quality threshold. Range is 1 to 100.

priority-group *list*

Assigns a priority group to an interface.

list Priority list number assigned to the interface.

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.

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.

Example

```
ring-speed 4
```

[no] shutdown

Disables an interface.

Example

```
Router(config)# interface ethernet0  
Router(config-if)# shutdown
```

[no] squelch [**normal** | **reduced**]

Using **squelch reduced** on the Cisco 4000 Ethernet Network Interface Module extends the twisted-pair 10BaseT capability beyond the standard 100 meters.

[no] transmit-clock-internal

When a DTE does not return a transmit clock, use the **transmit-clock-internal** interface configuration command to enable the internally generated clock on a serial interface on a Cisco 7000.

[no] transmitter-delay {*microseconds* | *hdlc-flags*}

Specifies a minimum dead-time after transmitting a packet. This command is especially useful for serial interfaces that can send back-to-back data packets over serial interfaces faster than some hosts can receive them.

<i>microseconds</i>	Approximate number of microseconds of minimum delay after transmitting a packet on the MCI and SCI interface cards.
<i>hdlc-flags</i>	Minimum number of HDLC flags to be sent between each packet on the IGS serial interface or the HSSI. The valid range on the IGS is 2 to 62; the valid range on the HSSI is 2 to 128000.

Examples

```
transmitter-delay 40
transmitter-delay 300
```

[no] tunnel checksum

Enables encapsulator-to-decapsulator checksumming of packets on a tunnel interface.

[no] tunnel destination *host-name* | *ip-address*

Specifies a tunnel interface's destination.

<i>host-name</i>	Name of the host destination.
<i>ip-address</i>	IP address of the host destination.

[no] tunnel key *key-number*

Enables an ID key for a tunnel interface.

key-number Integer from 0 to 4294967295.

[no] tunnel mode { **cayman** | **eon** | **gre** | **nos** }

Sets the encapsulation mode for the tunnel interface.

cayman Cayman TunnelTalk AppleTalk encapsulation.
eon EON compatible CLNS tunnel.
gre Generic route encapsulation protocol over IP.
nos KA9Q/NOS compatible IP over IP.

[no] tunnel sequence-datagrams

Configures a tunnel interface to drop datagrams that arrive out of order.

[no] tunnel source *ip-address* | *interface-type interface-number*

Sets a tunnel interface's source address.

ip-address IP address to use as the source address for packets in the tunnel.
interface-type All types.
interface-number See **interface** global configuration command for range.

tx-queue-limit *number*

Controls the size of the transmit queue available to a specified interface on the MCI and SCI cards.

number Number of packets that can be queued for transmission on the card for the specified interface.

EXEC Interface Management Commands

Enter each of the following commands from within EXEC mode.

clear appletalk arp

Deletes all the entries from the AppleTalk ARP (AARP) table.

Example

```
clear appletalk arp
```

clear appletalk neighbor [*neighbor-address*]

Deletes entries from the neighbor table. You cannot clear the entry for an active neighbor, that is, for a neighbor that still has RTMP connectivity.

neighbor-address (Optional.) Network address of the neighboring router whose entry is to be deleted from the neighbor table. The address is in the format *network.node*.

Example

```
clear appletalk neighbor 1.129
```

clear appletalk route [*network*]

Deletes routes from the routing table.

network (Optional.) Number of the network the route is to. If a network number is not specified, all routes are deleted.

Example

```
clear appletalk route 1
```

clear appletalk zone [*zone-name*]

Deletes entries from the zone name table.

zone-name (Optional.) Name of the zone whose entry is to be deleted from the zone table. If a zone name is not specified, all entries are deleted.

Example

```
clear appletalk zone Boojum
```

clear clns cache

Clears and reinitializes the CLNS routing cache.

clear clns es-neighbors

Removes ES neighbor information from the adjacency database.

clear clns is-neighbors

Removes IS neighbor information from the adjacency database.

clear clns neighbors

Removes CLNS neighbor information from the adjacency database.

clear clns route

Removes all of the dynamically derived CLNS routing information.

clear counters [*type unit*]

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

type (Optional.) Interface type: **serial**, **ethernet**, **tokenring**, **fddi**, or **hssi**.

unit (Optional.) Interface unit or card number.

Example

```
clear counters serial 1
```

clear interface *type unit*

Resets the hardware logic on an interface.

type Interface type: **serial**, **ethernet**, **tokenring**, **fddi**, **hssi**, or **bri 0**.

unit Interface connection or card number.

Examples

```
clear interface fddi 0
clear interface bri 0
```

clear ip bgp [{* | *address*}]

Resets a BGP connection.

*** (Optional.) Resets all current BGP sessions.

address (Optional.) Resets only the identified BGP neighbor.

clear ip route {*network* [*mask*] | * }

Removes one or more routes from the IP routing table.

clear ipx cache

Clears and reinitializes the IPX routing cache.

clear ipx route

Removes one or more routes from the IP routing table.

clear vines cache [**interface** *interface* | **neighbor** *address* | **server** *network*]

Deletes entries from the VINES fast-switching cache table.

no argument	Deletes the entire fast-switching cache.
interface <i>interface</i>	(Optional.) Deletes from the fast-switching cache table any entry that has one or more paths that go through the specified interface.
neighbor <i>address</i>	(Optional.) Deletes from the fast-switching cache table any entry that has one or more paths via the specified neighbor router.
server <i>network</i>	(Optional.) Deletes from the fast-switching cache table any entry whose network number part of the destination address matches the specified network address. The argument <i>network</i> can be either a 4-byte hexadecimal number or a 4-byte decimal number (if you have issued a vines decimal command).

clear vines neighbor {*network* | *}

Deletes entries from the neighbor table.

<i>network</i>	Network number of the neighbor.
*	All entries.

clear vines route {*network* | *}

Deletes network addresses from the routing table.

network Network number of the neighbor.
* All entries.

clear vines traffic

Clears all VINES-related statistics.

clear x25-vc *interface-name* [*vc*]

Clears an X.25 virtual circuit (if the optional VC number is specified) or restarts the packet layer, which implicitly clears all VCs.

vc (Optional.) Virtual circuit number.

Example

```
clear x25-vc serial 1 1024
```

cmt connect [*interface-name* [**phy-a** | **phy-b**]]

Starts the FDDI CMT process.

interface-name (Optional.) FDDI interface.
phy-a or **phy-b** (Optional.) Physical Sublayer A or B.

Example

```
cmt connect fddi 0 phy-a
```

cmt disconnect [*interface-name* [**phy-a** | **phy-b**]]

Stops the processes that perform the connection management (CMT) function and allow the ring on one fiber to be stopped.

interface-name (Optional.) FDDI interface.

phy-a or **phy-b** (Optional.) Physical Sublayer A or B.

Example

```
cmt disconnect fddi 0 phy-a
```

systat [**all**]

Displays information about the active ports of the router.

all (Optional.) Displays information for both active and inactive ports.

Interface Management Show Commands

The following commands are used to monitor interface management functions.

show async status

Lists the status of the asynchronous interface 1 associated with the router auxiliary port.

show controllers bri

Displays information about the ISDN Basic Rate Interface (BRI) on a Cisco 3000.

show controllers cbus

Displays all information under the ciscoBus controller card. On a Cisco 7000, use this command to determine how the HSSI card has identified the HSSI processor (HIP). This command also shows the capabilities of the card and reports controller-related failures.

show controllers cxbus

Displays information about the switch processor (SP) CxBus controller on the Cisco 7000.

show controllers fddi

Display all information under the FDDI controller card on the AGS+ or FDDI processor (FIP) on the Cisco 7000.

show controllers mci

Displays information about the multiport communications interface (MCI) card.

show controllers serial

Displays information about the fast serial interface processor (FSIP).

show controllers token

Displays information about memory management, error counters, and the CSC-R, CSC-1R, CSC-2R, C2CTR, and CSC-R16 (or CSC-R16M) Token Ring interface cards or Token Ring interface processor (TRIP), in the case of the Cisco 7000. Depending on the board being used, the output can vary. This command also displays information that is proprietary to Cisco Systems. Thus, the information that show controllers' token displays is of primary use to Cisco technical personnel.

show dialer [**interface** *interface type*]

Obtains a general diagnostic display for serial interfaces configured for DDR.

- interface** (Optional.) Indicates that information for the interface specified by the arguments *interface* and *type* is to be displayed.
- interface type* (Optional.) The arguments *interface* and *type* specify that information for a particular interface be displayed.

show interfaces *type unit* [*.subint*] [[*first*] [*last*] [**accounting**]
show interfaces *type slot/port* [*.subint*] [**accounting**] (for the Cisco 7000)

Displays statistics for all interfaces configured on the router.

- type unit* Specifies that information for a particular interface controller be displayed. Allowed values for type include **async**, **bri0**, **ethernet**, **fdi**, **hssi**, **loopback**, **null**, **serial**, **tokenring**, and **tunnel**.
For the Cisco 7000, type can be **ethernet**, **fdi**, **serial**, or **tokenring**.
unit must match a port number on the selected interface controller.
- .subint* (Optional.) Specifies that information for a particular subinterface be displayed.
- first last* (Optional.) The Cisco 3000 supports the ISDN Basic Rate Interface (BRI). The argument *first* can be either 1 or 2. The argument *last* can only be 2, indicating B channels 1 and 2. D-channel information is obtained by using the command without the optional arguments.

accounting	(Optional.) Displays the number of packets of each protocol type that has been sent through the interface. You can show these numbers for all interfaces, or you can specify a specific <i>type</i> and <i>unit</i> .
<i>slot</i>	Specifies the backplane slot number and can be 0, 1, 2, 3, or 4 .
<i>port</i>	Specifies the port number of the interface and can be 0, 1, 2, 3, 4, or 5 depending on the type of interface, as follows: EIP (Ethernet Interface Processor) 0, 1, 2, 3, 4, or 5 TRIP (Token Ring Interface Processor) 0, 1, 2, or 3 FIP (FDDI Interface Processor) 0 HIP (HSSI Interface Processor) 0

show interfaces async [*unit*] [accounting**]**

Displays information about the serial interface.

<i>unit</i>	(Optional.) Must be 1.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.

show interfaces bri 0 [*first*] [*last*] [**accounting**]

Displays information about the BRI D and B channels.

<i>first last</i>	(Optional.) The argument <i>first</i> can be either 1 or 2. The argument <i>last</i> can only be 2, indicating B channels 1 and 2. D-channel information is obtained by using the command without the optional arguments.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.

show interfaces ethernet *unit* [**accounting**]

show interfaces ethernet *slot/port* [**accounting**] (on a Cisco 7000)

Displays information about an Ethernet interface on the router.

<i>unit</i>	Must match a port number on the selected interface.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.
<i>slot</i>	On a Cisco 7000, optional slot location of the interface processor.
<i>port</i>	On a Cisco 7000, optional port number on interface.

show interfaces fddi *unit* [accounting]

show interfaces fddi *slot/port* [accounting] (for the Cisco 7000)

Each displays information about the FDDI interface.

<i>unit</i>	Must match a port number on the selected interface.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.
<i>slot</i>	On a Cisco 7000, optional slot location of the interface processor.
<i>port</i>	On a Cisco 7000, optional port number on interface.

show interfaces hssi *unit* [accounting]

show interfaces hssi *slot/port* [accounting] (for the Cisco 7000)

Displays information about the HSSI interface.

<i>unit</i>	Must match a port number on the selected interface.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.
<i>slot</i>	On a Cisco 7000, optional slot location of the interface processor.
<i>port</i>	On a Cisco 7000, optional port number on interface.

show interfaces ip-brief

Lists a brief summary of an interface IP information and status.

show interfaces serial *unit* [accounting]

show interfaces serial *slot/port* [accounting] (for the Cisco 7000)

Displays information about a serial interface.

<i>unit</i>	Must match the interface port number.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.
<i>slot</i>	On a Cisco 7000, optional slot location of the interface processor.
<i>port</i>	On a Cisco 7000, optional port number on interface.

show interfaces tokenring *unit* [accounting]

show interfaces tokenring *slot/port* [accounting] (for the Cisco 7000)

Each of these commands displays information about the Token Ring interface and the state of source-route bridging.

<i>unit</i>	Must match the interface port line number.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.
<i>slot</i>	On a Cisco 7000, optional slot location of the interface processor. Value can be 0, 1, 2, 3, or 4 .
<i>port</i>	On a Cisco 7000, optional port number on interface. Value can be 0, 1, 2, or 3 .

show interfaces tunnel *unit* [accounting]

Lists tunnel interface information.

<i>unit</i>	Must match the interface port line number.
accounting	(Optional.) Displays the number of packets of each protocol type that have been sent through the interface.

show queueing custom | priority

Lists the current state of queue lists.

- custom** Shows status of custom queue lists.
- priority** Shows status of priority lists.

Frame Relay Global Configuration Command

Enter the following Frame Relay command from within global configuration mode.

[no] frame-relay switching

Enables PVC switching on a Frame Relay DCE or NNI.

Example

```
frame-relay switching
```

Frame Relay Interface Configuration Commands

Enter the following Frame Relay commands from within interface configuration mode.

[no] frame-relay intf-type [dce | dte | nni]

Configures a Frame Relay switch type.

- dce** (Optional.) Sets the router to function as a switch connected to a router.
- dte** (Optional.) Configures the router to connect to a Frame Relay network.
- nni** (Optional.) Sets the router to function as a switch connected to a switch (supports Network to Network Interface, or NNI, connections).

Example

```
interface serial 2
frame-relay intf-type DTE
```

[no] frame-relay inverse-arp *protocol dlci*

Enables the Inverse Address Resolution Protocol (InvARP) on the router configured for Frame Relay.

protocol Identifies the protocol. Can be one of the following:
appletalk, decnet, ip, novell, xns.

dlci DLCI number for the interface. Acceptable numbers are integers in the range 16 to 1007.

Example

```
interface serial 0
frame-relay inverse-arp appletalk 100
```

[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.

Example

```
frame-relay keepalive 15
```

[no] frame-relay lmi-n391 dte *keep-exchanges*

Sets a full status polling interval. Use the **no** form to restore the default interval, assuming an LMI has been configured.

keep-exchanges Number of keep exchanges to be done before requesting a full status message. Acceptable value is a positive integer from 1 to 255.

Example

```
interface serial 0
frame-relay intf-type DTE
frame-relay lmi-n391dte 4
```

[no] frame-relay lmi-n392 dce *threshold*

Sets the DCE and NNI error threshold.

threshold Error threshold value. Acceptable value is a positive integer from 1 to 10.

Example

```
interface serial 0
frame-relay intf-type DCE
frame-relay lmi-n392dce 3
```

[no] frame-relay lmi-n392dte *threshold*

Sets the error threshold on a DTE or NNI interface.

threshold Error threshold value. Acceptable value is a positive integer from 1 to 10.

Example

```
interface serial 0
frame-relay intf-type DTE
frame-relay lmi-n392dte 4
```

[no] frame-relay lmi-n393dce *events*

Sets the DCE and NNI monitored events count.

events Specifies the monitored events count value.
Acceptable value is a positive integer from 1 to 10.

Example

```
interface serial 0
frame-relay intf-type DCE
frame-relay lmi-n393dce 3
```

[no] frame-relay lmi-n393dce events

Sets the error threshold on a DTE or NNI interface.

events Monitored event count value. Acceptable value is a positive integer from 1 to 10.

Example

```
interface serial 0
frame-relay intf-type DTE
frame-relay lmi-n393dte 3
```

[no] frame-relay lmi-t392dce timer

Sets the polling verification timer on a DCE or NNI interface.

timer Polling verification timer value. Acceptable value is a positive integer from 5 to 30.

Example

```
interface serial 3
frame-relay intf-type DCE
frame-relay lmi-t392dce 3
```

[no] frame-relay lmi-type [cisco | ansi | ccitt]

Selects the exchange of local management interface messages as Cisco/Stratacom/Northern Telecom/DEC specification, ANSI specification T1.617 annex D, or CCITT specification Q.983 annex A. The **no** form restores the LMI type to the default as defined by the Cisco/StrataCom/Northern Telecom/DEC 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.

Example

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

frame-relay map *protocol protocol-address dlci* [**broadcast**] [**ietf**]
frame-relay map bridge *dlci broadcast*
frame-relay map clns *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.

bridge	Specifies bridging.
clns	Specifies ISO CLNS protocol.
<i>protocol</i>	One of these keywords: ip , decnet , appletalk , xns , novell , vines , or clns .
<i>protocol-address</i>	Protocol address.
<i>dlci</i>	DLCI number.
broadcast	Specifies that broadcasts be forwarded to this address when the multicast is not enabled.
ietf	(Optional.) Selects RFC 1294 Frame Relay encapsulation.

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.

Example

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

[no] frame-relay route *in-dlci out-interface out-dlci*

Sets the error threshold on a DTE or NNI interface.

<i>in-dlci</i>	DLCI on which the packet is received on the interface.
<i>out-interface</i>	Interface the router uses to transmit the packet.
<i>out-dlci</i>	DLCI the router uses to transmit the packet over the specified <i>out-interface</i> .

Example1

```
frame-relay route 100 interface serial2 200
```

Example2

```
interface serial1
no ip address
encapsulation frame-relay
keepalive 15
frame-relay lmi-type ansi
frame-relay intf-type dce
frame-relay route 100 interface serial2 200
frame-relay route 101 interface serial2 201
clockrate 200000
```

Frame Relay Show Commands

The following commands display information about Frame Relay functions:

Command	Display
show frame-relay lmi	Statistics about the local management interface.
show frame-relay map	Information about the current Frame Relay map.
show frame-relay pvc	Information about the Frame Relay PVC.
show frame-relay route	Frame Relay routing table information.
show frame-relay traffic	Frame Relay statistics.

SMDS Global Configuration Command

Enter the following SMDS command from within global configuration mode.

arp *ip-address smds-address* smds

Allows inclusion of static ARP entries.

<i>ip-address</i>	IP address.
<i>smds-address</i>	Individual address provided by the SMDS provider.

Example

```
arp 128.27.101.8 c141.5797.1311 smds
```

SMDS Interface Configuration Commands

Enter the following SMDS commands from within interface configuration mode.

[no] smds address *smds-address*

Sets or removes the SMDS individual address for a particular interface.

smds-address Individual address provided by the SMDS service provider.

Example

```
smds address C141.5797.1313
```

[no] smds enable-arp

Enables or disables ARP processing on a particular interface. Set the multicast address for ARP before issuing this command. Default is disabled.

[no] smds multicast *protocol-type smds-group-address*

Maps an SMDS group address to a broadcast or multicast address used by higher-level protocols. The **no** form of the command, with arguments, removes a multicast address.

protocol-type Name of the protocol: **ip**, **arp**, **decnet**, **decnet_router**, **decnet_node**, **appletalk**, **aarp**, **xns**, **novell**, **clns**, **clns_is**, or **clns_es**.

smds-group-address SMDS address.

Example

```
smds multicast IP E180.0999.9999
```

[no] smds static-map *protocol-type protocol-address smds-address*

Sets up a static mapping between an SMDS address and a higher-level protocol address. Do not use this command for broadcast addresses; instead, use the **smds multicast** command.

protocol-type Name of the protocol: **ip, decnet, appletalk, xns, novell, or clns.**

protocol-address Address of specified protocol.

smds-address SMDS address.

Example

```
smds static-map XNS 111.00C0.2711.0123 C141.  
5688.1212
```

SMDS Show Commands

The following commands display information about SMDS functions:

Command	Display
show smds addresses	Addresses and associated interfaces.
show smds map	SMDS addresses mapped to a higher-level protocol.
show smds traffic	SMDS counters.

X.25 EXEC Command

Enter the following X.25 command at the EXEC prompt.

bfe {**enter** | **leave**} *interface-type number*

Controls Blacker Emergency Mode when the **x25 bfe-decision ask** configuration command is set.

enter	Router enters emergency mode.
leave	Router leaves emergency mode.
<i>interface-type</i>	Interface name. Typically serial.
<i>number</i>	Interface number, port number, card number, and so on.

Example

```
bfe leave serial 1
```

X.25 Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] x25 host *name x.121-address*

Defines a symbolic name for an X.121 address.

<i>name</i>	Symbolic name
<i>X.121-address</i>	Associated X.121 address.

[no] x25 route [#position] X.121-patt [**cud patt**] **interface** int-name
[no] x25 route [#position] X.121-patt [**cud patt**] **ip** ip-address
[no] x25 route [#position] X.121-patt [**cud patt**] **alias** int-name
[no] x25 route [#position] X.121-patt [**substitute-source pattern**]
[substitute-dest pattern] [**cud patt**] **interface** destination

Inserts or removes an entry in the X.25 routing table.

<i>#position</i>	(Optional.) Positional parameter that indicates the existing entry before which the current entry will be inserted.
<i>X.121-patt</i>	X.121 address pattern of the called destination. The following table lists pattern matching and pattern substitution characters.
 cud patt	(Optional.) Call User Data pattern.
interface <i>int-name</i>	Interface name.
ip <i>ip-address</i>	Destination IP address.
alias	Treats X.121 address pattern as an alias for the specified interface's X.121 address. This permits the router to accept calls to alternate destinations.
 substitute-source	(Optional.) Allows substitution of the calling address.
 substitute-dest	(Optional.) Allows substitution of the called (destination) address.
<i>pattern</i>	Replacement pattern for the called or calling X.121 address in routed X.25 calls.
interface <i>destination</i>	Destination interface.

Use the following table for pattern matching:

Pattern	Description
*	Matches 0 or more sequences of the regular expressions.
+	Matches 1 or more sequences of the regular expressions.
?	Matches the null string regular expression.
^	Matches the null string at the beginning of the input string.
\$	Matches the null string at the end of the input string.
\char	Matches <i>char</i> .
.	Matches any single character.

Use the following table for pattern substitution:

Pattern	Description
\0	Replaces the entire original address.
\1...9	Replaces strings that match the first through ninth parenthesized part of the X.121 address.

Example

```
x25 route ^1111(.*) subst-dest 2222\1 interface serial 3
```

[no] x25 routing [TCP-USE-IF-DEFS]

Enables or disables X.25 switching. X.25 calls are not forwarded until this command is issued.

TCP-USE-IF-DEFS (Optional.) Modifies the behavior of the router when receiving remotely routed call requests from older Cisco X.25 implementations. The default behavior is to accept such a call, indicating the universally acceptable values of two packet windows and maximum packet sizes of 128. When TCP-USE-IF-DEFS is configured, the call is accepted, indicating the default values of the interface the call was switched to. This behavior may cause problems if the values indicated in the call accept do not match the values assumed by the router that set up the remote route.

[no] x25 rpoa name number [number...]

Specifies a list of transit Recognized Private Operating Agencies (RPOAs) to use, referenced by name. A sequence of up to ten RPOA identification numbers can be specified.

LAPB and X.25 Interface Configuration Commands

Enter the following LAPB and X.25 commands from within interface configuration mode.

[no] cmns enable

Enables or disables CMNS on a nonserial interface.

lapb k window-size

Defines the maximum permissible number of outstanding LAPB frames.

window-size Frame count, from 1 to 7.

Example

```
lapb k 4
```

lapb n1 *bits*

Defines the maximum number of bits a LAPB frame can hold. Default is 12056 bits (1507 bytes).

bits Number of bits. Must be a multiple of 8 from 1088 to 32840, but cannot exceed the interface mtu capability.

Example

```
lapb n1 6000
```

lapb n2 *retries*

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

retries Transmission count, from 1 to 255.

Example

```
lapb n2 100
```

lapb t1 *milliseconds*

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

milliseconds Number of milliseconds, from 1 to 64000.

Example

```
lapb t1 32000
```

[no] x25 accept-reverse

Instructs the router to accept all reverse charge calls by default, which also can be configured on a peer-to-peer basis using the **x25 map** interface configuration command. The **no** form disables this feature.

x25 address *X.121-address*

Sets the X.121 address of a particular network interface. When connecting to a PDN, this address is assigned by the X.25 network supplier.

X.121-address Variable-length X.121 address.

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. This is the default.
- 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.

Example

```
x25 bfe-decision ask
```

x25 bfe-emergency { never | always | decision }

Specifies the circumstances under which the router enters Blacker Emergency 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.

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 for calls originated by the router. This forces X.25 facilities to request the given facilities for all calls it originates. . The **no** form of the command, with keyword and argument, removes the facility.

Choose one of the following keyword-argument pairs:

cug <i>number</i>	Specifies a Closed User Group <i>number</i> from 1 through 99 to reach another member of the CUG.
packetsize <i>in-size out-size</i>	Requests the size in bytes of input packets (<i>in-size</i>) and output packets (<i>out-size</i>). Both values should be the same, and must be a power of 2 between 16 and 4096.
reverse	Reverses charges on all calls originated from the interface.

window-size <i>in-size out-size</i>	Requests the packet count for input windows (<i>in-size</i>) and output windows (<i>out-size</i>). Both values should be the same, and must be between 1 and one less than the packet numbering modulo (7 or 127).
throughput <i>in out</i>	Requests the values for input and output throughput across the network; values must be valid X.25 throughput values.
rpoa <i>name</i>	Specifies the list of transit Recognized Private Operating Agencies (RPOAs) to use in originated calls.
transit-delay <i>number</i>	Requests a transit delay value in milliseconds (0 to 65334) requested for originated calls.

Examples

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

x25 hic *circuit-number*

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

circuit-number Virtual circuit number from 1 to 4095; zero disables the range.

Example

```
x25 hic 10
```

x25 hoc *circuit-number*

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

circuit-number Virtual circuit number from 1 to 4095; zero disables the range.

Example

```
x25 hoc 2048
```

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

Defines the number of packets the router can hold while a virtual circuit (VC) is unable to send data. A value of zero specifies that all VCs created have no limit to the number of packets that can be held pending transmission. The **no** form restores the default of ten.

queue-size Number of packets.

Example

```
x25 hold-queue 3
```

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

When the hold virtual circuit (VC) timer is configured, no additional calls to a destination will be originated for the specified period after an originated call fails (is cleared instead of being accepted). This prevents overruns on X.25 switches. When this command is activated, incoming calls are still accepted. Routed calls are affected by this feature. The **no** form restores the default of zero.

minutes Number of minutes to prevent call origination to a previously failed destination.

Example

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

x25 htc *circuit-number*

Sets the highest two-way virtual circuit number. Default is 1024 for X.25, and 4095 for CMNS.

circuit-number Virtual circuit number from 1 to 4095; zero disables the range.

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Example

```
x25 htc 512
```

[no] x25 idle *minutes*

Sets the inactivity period. An SVC will be cleared when it has been idle for this period. Affects calls both originated and terminated by the router. Routed calls are not affected. The **no** form restores the default of zero minutes.

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

Example

```
x25 idle 1
```

[no] x25 ip-precedence

Enables or disables the router's ability to open separate virtual circuits based on the IP precedence field. By default, the router opens one virtual circuit that carries all precedence values.

x25 ips *bytes*

Sets a nonstandard default maximum input packet size. This packet size should match that of the network. Default is the standard value of 128 bytes.

bytes Byte count of 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096. Larger packet sizes are less likely to require fragmentation overhead. Use the same byte value for **x25 ips** and **x25 ops** unless your network supports asymmetry between input and output packet sizes.

Example

```
x25 ips 1024
```

x25 lic *circuit-number*

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

circuit-number Virtual circuit number from 1 to 4095; zero disables the range.

Example

```
x25 lic 2
```

[no] x25 linkrestart

Forces a packet-level restart when the link level resets. The **no** form turns off this behavior. Default is enabled. Use of the **no** form is not recommended, and is provided only for attachment to networks that require this behavior be disabled.

x25 loc *circuit-number*

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

circuit-number Virtual circuit number from 1 to 4095; zero disables the range.

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 to 4095; zero disables the range.

Example

```
x25 ltc 20
```

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

Specifies a protocol-to-X.121 address mapping, such as IP-to-X.121 or DECnet-to-X.121.

<i>protocol-keyword</i>	Protocol type: ip, decnet, xns, novell, appletalk, vines, apollo, cns, bridge, cmns, or compressedtcp.
<i>protocol-address</i>	Protocol address to be mapped.
<i>X.121-address</i>	X.121 address to which the protocol address will be mapped.

The following mapping features can be used for the *option* argument:

accept-reverse	Instructs the router to accept incoming reverse-charged calls. If this option is not present, and the interface is not configured to accept reverse-charged calls. Reverse-charged incoming calls that use this map will be cleared.
broadcast	Instructs the router to copy any protocol broadcasts sent through this interface to this destination. 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 to 99) for outgoing calls to reach another member of the CUG.
nudata nuid-info	Specifies that the network ID facility be sent/checked in outgoing/incoming calls with the information given. Generally used when connecting with equipment from other vendors.
nuid username password	Specifies that the network ID facility be sent/checked in the outgoing/incoming call with the specified username and password. Generally used between two Cisco routers.

nvc count	Sets the maximum number of concurrent virtual circuits (VCs) for this protocol/destination pair. The default count is the x25 nvc setting of the interface. A maximum number of 8 VCs can be configured for a single protocol/host. This option cannot be used for compressed TCP maps.
packetsize in-size out-size	Requests a maximum input packet size (<i>in-size</i>) and output packet size (<i>out-size</i>) for originated calls.
reverse	Specifies reverse charging for originated calls.
rpoa	Specifies the list of transit Recognized Private Operating Agencies to use in originated calls.
throughput in out	Requests bandwidth through the X.25 network on originated calls.
transit-delay number	Requests the transit delay value in milliseconds (0 to 65334) for originated calls.
window-size in-size out-size	Requests packet input window size (<i>in-size</i>) and output window size (<i>out-size</i>) for originated calls.

Example

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

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

Specifies Internet-to-X.121 mapping.

<i>X.121-address</i>	X.121 address.
broadcast	Bridges X.25 frames.
<i>options</i>	(Optional.) Services that can be added to this map. See the x25 map command for options.

Example

```
x25 map bridge 31370054065 broadcast
```

Interface and Media Configuration Commands

[no] x25 map cmns *nsap* {*mac-address* | *X.121-address*}

Maps NSAP addresses to either MAC-layer addresses or X.121 addresses. Required for CMNS on a nonserial interface or switching to a serial interface. The **no** form with address arguments cancels the mapping.

<i>nsap</i>	DTE NSAP address or NSAP address prefix.
<i>mac-address</i>	MAC address.
<i>X.121-address</i>	X.121 address.

Example

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

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

Specifies an IP protocol-to-X.121 address mapping. This command is required to carry compressed TCP header traffic. The **no** form cancels the mapping.

<i>ip-address</i>	IP address.
<i>X.121-address</i>	X.121 address.
<i>options</i>	(Optional.) See the x25 map command for options.

Example

```
x25 map compressedtcp 131.108.9.2 31370054065
```

x25 modulo *modulus*

Sets the packet-numbering 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.

<i>modulus</i>	8 or 128.
----------------	-----------

Example

```
x25 modulo 128
```

x25 nvc count

Specifies the maximum number of concurrent switched virtual circuits that can be open to one host/protocol pair. Default is 1.

count Circuit count from 1 to 8.

Example

```
x25 nvc 3
```

x25 ops bytes

Sets a nonstandard default maximum output packet size; should match that of the network. Default is the standard value of 128 bytes.

byte Byte count of 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096. Larger packet sizes are less likely to require fragmentation overhead. Use the same byte value for **x25 ips** and **x25 ops** unless your network supports asymmetry between input and output packet sizes.

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** interface configuration command before you can set up a PVC.

<i>circuit</i>	Virtual circuit number. Must be lower than the lower limit of any defined virtual circuit range (see the keywords lic , lrc , and loc).
<i>protocol-keyword</i>	Protocol type: ip , decnet , xns , novell , appletalk , vines , apollo , clns , bridge , or cmns .
<i>protocol-address</i>	Protocol address of the host at the other end of the PVC.

Examples

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

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

Configures a PVC for local X.25 switching. Both interfaces must be configured to connect the PVC.

<i>pvc-number</i>	PVC number; the first is the number used on the local interface, the second is the number on the destination interface.
interface <i>interface-name</i>	Destination interface type and unit number.
<i>options</i>	(Optional.) The window size and packet size options can be entered; see the x25 map command options for syntax.

Example

```
x25 pvc 2 interface Serial0 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). Both interfaces must be configured to connect the PVC.

<i>pvc-number</i>	PVC number; the first is the number used on the local interface, the second is the number on the remote interface.
tunnel	Specifies X.25 remote PVC switching.
<i>ip-address</i>	Address of the remote router.
interface serial <i>unit</i>	Remote serial interface port.
pvc <i>pvc-number</i>	Specifies the remote PVC number.
<i>options</i>	(Optional.) The window-size and packet-size options can be entered. See the x25 map command options.

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*

Defines an entry in the table listing BFE nodes to which the router will send packets.

<i>host-ip-address</i>	IP address of a host or router to which packets are sent.
remote-black	Specifies remote Blacker Front End unit.
<i>blacker-ip-address</i>	IP address of remote Blacker Front End unit in front of the host to which packets are sent.

Example

```
x25 remote-red 21.0.0.12 remote-black 21.0.0.1
```


[no] x25 suppress-called-address

Omits the called (destination) X.121 address in Call and Call Confirm 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 called address.

[no] x25 suppress-calling-address

Omits the calling (source) X.121 address in Call and Call Confirm 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 value for the Restart Indication retransmission timer (T10) on DCE devices. Default is 60 seconds.

seconds Number of seconds.

Example

```
x25 t10 90
```

x25 t11 seconds

Sets the value for the Incoming Call timer (T11) on DCE devices. Default is 180 seconds.

seconds Number of seconds.

Example

```
x25 t11 90
```

x25 t12 *seconds*

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

seconds Number of seconds.

Example

```
x25 t12 90
```

x25 t13 *seconds*

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

seconds Number of seconds.

Example

```
x25 t13 90
```

x25 t20 *seconds*

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

seconds Number of seconds.

Example

```
x25 t20 90
```

x25 t21 *seconds*

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

seconds Number of seconds.

Example

```
x25 t21 220
```

x25 t22 *seconds*

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

seconds Number of seconds.

Example

```
x25 t22 100
```

x25 t23 *seconds*

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

seconds Number of seconds.

Example

```
x25 t23 200
```

x25 th *count*

Sets the acknowledgment threshold. For datagram encapsulation calls, the router normally withholds acknowledgment of incoming frames until the incoming window is full. This improves the use of bandwidth for VCs that carry bidirectional traffic (because outgoing data packets acknowledge received packets) at the expense of responsiveness for VCs with a more unidirectional or bursty traffic pattern.

This parameter, if configured, sets the number of packets that can be received before an acknowledgment will be sent. (For example, a value of 1 causes each incoming data packet to be acknowledged immediately.) This assumes that an outgoing data packet cannot be used to

acknowledge the received packets. This command improves line responsiveness at the expense of bandwidth. Zero restores the default behavior.

count Number of input packets, from zero to the input window size. The value 1 instructs the router to send an acknowledgment for each packet.

Example

```
x25 th 1
```

[no] x25 use-source-address

Updates the source address of outgoing calls forwarded over a specific interface. The **no** form allows the original source address to be sent and is the default.

x25 {win | wout} packets

Sets nonstandard default input and output window sizes. Set **win** and **wout** to the same value unless your network supports asymmetry between input and output window sizes. Defaults are 2.

win Specifies the default limit of the number of outstanding unacknowledged packets in the input window.

wout Specifies the default limit 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 the VC hold queue. The value must be between 1 and the interface modulus -1.

Example

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

X.25 Show Commands

The following commands permit you to display X.25 information on the router:

Command	Display
show cmns	CMNS traffic and activity.
show x25 map	Network protocol-to-X.121 address mapping.
show x25 remote-red	One-to-one mapping of the host IP addresses and remote BFE IP addresses.
show x25 route	X.25 routing table.
show x25 vc	Virtual circuit parameters and statistics.

Protocol Configuration

The commands in this section are organized alphabetically according to the protocols supported on your router.

Apollo Domain Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] apollo access-list *access-list-name* {**permit** | **deny**} [*firstnet.host–lastnet.host* [*wildcard-mask*]

Specifies Apollo Domain access conditions.

<i>access-list-name</i>	Defined by the network administrator for the access list.
permit or deny	Specifies permit or deny condition for this list.
<i>firstnet.host–</i>	(Optional.) First number in a network range.
<i>lastnet.host</i>	Last number in a network range. Use the argument <i>lastnet.host</i> to specify a single network.
<i>wildcard-mask</i>	(Optional.) Wildcard mask that uses the one bits to ignore the host part of the network address. Host bits corresponding to wildcard mask bits set to zero are used in comparisons.

Example

```
apollo access-list Engineering permit 89.5
```

[no] apollo maximum-paths *paths*

Sets or cancels the maximum number of multiple paths that the router remembers and uses. Default is 1.

paths Number of paths to be assigned.

Example

```
apollo maximum-paths 5
```

[no] apollo route *destination-network network.host*

Specifies static routes for an Apollo Domain network.

destination-network Network number.

network.host Address to which to forward packets.

Example

```
apollo route 45 17.32
```

[no] apollo routing *host*

Enables or disables Apollo routing and specifies which system-wide host address to use.

host Unique, five-digit hexadecimal host address.

Example

```
apollo routing 1293c
```

Apollo Domain Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] apollo access-group *access-list-name*

Specifies the interface on which an Apollo Domain access list is defined.

access-list-name User-defined name for the access list defined by the **apollo access-list** global configuration command.

Example

```
apollo access-group eng
```

[no] **apollo network** *number*

Assigns Apollo Domain network numbers to the appropriate interface.

number Network number expressed in hexadecimal form.

Example

```
apollo network 4e
```

[no] **apollo update-time** *interval*

Sets the Apollo Domain routing update timers. Default is 30 seconds.

interval Number of seconds between updates. The minimum value is 10 seconds.

Example

```
apollo update-time 20
```

Apollo Domain Show Commands

The following commands permit you to monitor Apollo Domain functions on your router:

Command	Display
show apollo arp	Portion of Address Resolution Protocol (ARP) table pertaining to Apollo Domain ARP.
show apollo interface [<i>interface unit</i>]	Apollo Domain parameters that have been configured on the interfaces.
show apollo route [<i>network</i>]	Apollo Domain routing table.
show apollo traffic	Number and type of Apollo Domain packets transmitted and received.

Protocol Configuration

AppleTalk Global Configuration Commands

Enter the following commands from within global configuration mode.

access-list *access-list-number* {**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.

<i>access-list-number</i>	An integer between 600 and 699.
permit or deny	Specifies the permit or deny condition.

Example

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

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

Establishes an ACL for a range of network numbers. Affects extended networks with starting and ending numbers exactly matching those specified in the command when used in conjunction with the **distribute-list** command.

<i>access-list-number</i>	An integer between 600 and 699.
permit or deny	Specifies the permit or deny condition.
<i>start-end</i>	The cable range.

Example

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

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

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

access-list-number An integer between 600 and 699.

permit or **deny** Specifies the permit or deny condition.

start-end The cable range.

Example

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

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

Establishes an AppleTalk access control list (ACL) for a single network number. The ACL affects matching nonextended networks when used in conjunction with the **distribute-list** commands.

access-list-number An integer between 600 and 699.

permit or **deny** Specifies the permit or deny condition.

network AppleTalk network number.

Example

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

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

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

[no] access-list *access-list-number* {**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.

<i>access-list-number</i>	An integer between 600 and 699.
permit or deny	Specifies the permit or deny condition.
<i>start-end</i>	The cable range.

Example

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

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

Establishes an ACL that, depending on its usage, applies to either any network that has the specified *zone* in its zone list or to the zone itself.

<i>access-list-number</i>	An integer between 600 and 699.
permit or deny	Specifies the permit or deny condition.
<i>zone-name</i>	AppleTalk zone name.

Example

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

[no] appletalk alternate-addressing

Displays network numbers in a two-octet format. This format consists of printing the upper and lower bytes of a network number as 8-bit decimal values separated by a decimal point. For example, the cable range 511 to 512 would be printed as 1.255-2.0. The **no** form of this command returns the router to displaying network numbers in the format *network.node*.

Example

The following example enables the display of network numbers in a two-octet format:

```
appletalk alternate-addressing
```

[no] appletalk arp

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

appletalk arp [probe | request] interval *interval*

Specifies the interval, in milliseconds, between retransmission of ARP packets. Default is **probe**.

- probe** (Optional.) Sets parameters associated with the router's dynamic address assignment. Default is 200.
- request** (Optional.) Sets parameters that the router uses to resolve another node's address. Default is 1000.
- interval*** Number of milliseconds in the interval. Must be 33 or greater.

Example

```
appletalk arp interval 100
```

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

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

- probe** (Optional.) Sets parameters associated with the router's dynamic address assignment. Default is 10.
- request** (Optional.) Sets parameters that the router uses to resolve another node's address. Default is 5.
- number*** Transmission count. The minimum value is 1.

Protocol Configuration

Example

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

[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.

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.

<i>ip-address</i>	The IP address.
<i>server-zone</i>	The name of the zone containing the MacIP server.

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.

<i>ip-address</i>	The IP address. To specify a range, supply the first and last IP addresses separated by a space.
<i>server-zone</i>	The name of the zone containing the MacIP server.

Examples

```
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 zero or the **no** form disables name lookup. Default is zero.

seconds Number of seconds.

Example

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

[no] appletalk permit-partial-zones

Permits access to other networks on a zone when access to one of those networks is denied.

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

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.

zonenumber 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.

Example

```
appletalk proxy-npb 60 Twilight
```

[no] appletalk require-route-zones

Prevents advertisements of routes (network number or cable ranges) that have no assigned zone. 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-checking

Enforces maximum checking of routing packets to ensure their validity. The default is enabled.

[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. The 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.

Example

```
appletalk timers 20 40 120
```

[no] appletalk zip-query-interval *interval*

Specifies the interval at which the router sends ZIP queries.

- interval* The period, in seconds, between ZIP queries. The default is 10 and can be any positive integer.

AppleTalk Interface Configuration Commands

Enter any of the following AppleTalk commands from within interface configuration mode.

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

Creates a *packet filter*, which prevents any packets from being sent out an interface if the source 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 to 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.

Example

```
appletalk access-group 699
```

[no] appletalk address *network.node*

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

network.node AppleTalk address.

Example

```
appletalk address 1.129
```

[no] appletalk arp-timeout *interval*

Specifies the interval at which entries are aged out of the ARP table.

interval Time in minutes. The default is 240 minutes.

[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 (Optional.) Network and node number that the router should first use to select the AppleTalk address for this interface.

Example

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

[no] appletalk discovery

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

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

Filters incoming routing updates so that only permitted networks are inserted into the AppleTalk routing table.

access-list-number Number of a predefined access list in the range 600 to 699.

Example

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

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

Filters outgoing routing updates so that only permitted networks are transmitted to other routers. The **no** form removes the filter.

access-list-number Access list number in the range 600 to 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.

Example

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

[no] appletalk free-trade-zone

Establishes a free-trade zone. A free-trade zone is a part of an AppleTalk internet that is accessible by two other parts of the internet, neither of which can access the other.

This command has the following effect on the interface:

- All incoming RTMP updates are ignored.
- All outgoing RTMP updates contain no information.
- NBP conversion of BrRq packets to FwdReq packets is not performed.
- The GZL for free-trade zone nodes will be empty.

Example

```
interface ethernet 0
  appletalk cable-range 5-5
  appletalk zone FreeAccessZone
  appletalk free-trade-zone
```

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

Modifies GetZone-List replies.

access-list-number Access list number in the range 600 to 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

Example

```
appletalk getzonelist-filter 600
```

[no] appletalk glean-packets

Derives AARP table entries from incoming packets (on AppleTalk Phase 1 networks only).

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.

Example

```
appletalk iptalk 30.0 UDPzone
```

[no] 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.

Protocol Configuration

Example

```
appletalk iptalk-baseport 200
```

[no] **appletalk route-cache**

Enables fast switching on interfaces that support it. The default is enabled.

[no] **appletalk send-rtmps**

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** *zone-name*

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.

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

Example

```
appletalk zone twilight
```

[no] **tunnel destination** *ip-address*

Specifies the destination for encapsulated packets.

ip-address Internet address of destination router.

[no] **tunnel source** {*interface* | *ip-address*}

Specifies the interface out which encapsulated packets are sent.

interface Name of network interface.

ip-address Internet address of source interface.

AppleTalk Show Commands

The following commands display information about AppleTalk on your router:

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

Banyan VINES EXEC Commands

Enter the following commands from within EXEC mode.

ping vines {*host* | *address*}

Sends Banyan VINES echo packets to test the reachability of a remote host over a network.

host Host name of system to ping.
address Address of system to ping.

trace [vines] [*address*]

Discovers the path the VINES packets actually take when traveling to their destination.

address (Optional.) Destination address or host name on the command line. The default parameters for the appropriate protocol are assumed and the tracing action begins.

Banyan VINES Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] vines access-list *access-list-number* {**permit** | **deny**} *protocol*
source-address *source-address-mask* [*source-port*] *destination-*
address *destination-* *address-mask* [*destination-port*]

Specifies a standard VINES access list. The *access-list-number* can range from 1 to 100.

[no] vines access-list *access-list-number* {**permit** | **deny**} *protocol*
source-address source-address-mask [*source-port source-port-mask*]
destination-address destination-address-mask [*destination-port*
destination-port-mask]

Specifies an extended VINES access list. The *access-list-number* can range from 101 to 200.

[no] vines access-list *access-list-number* {**permit** | **deny**}
source-address source-mask

Specifies a simple VINES access list. The *access-list-number* can range from 201 to 300.

The following arguments and keywords apply to the VINES access lists.

<i>access-list-number</i>	Access list number from 1 to 300.
permit or deny	Specifies the permit or deny condition.
<i>protocol</i>	An integer between 1 and 255, or one of the following protocols: SPP —Sequence Packets Protocol RTP —Routing Table Protocol ARP —Address Resolution Protocol IPC —Interprocess Communications ICP —Internet Control Protocol
<i>source-address</i> and <i>destination-address</i>	VINES addresses written in the standard form.
<i>source-mask</i> and <i>destination-mask</i>	VINES addresses that indicate the bits in the corresponding address that should be ignored.
<i>source-port</i> and <i>destination-port</i>	Port numbers expressed as integers from 0 to 65535.

Examples

```
vines access-list 1 permit IP 0:1 ffffffff:0 0:1 ffffffff:0  
vines access-list 1 deny IP 0:0 ffffffff:ffff 0:0  
ffffffff:ffff
```

Protocol Configuration


```
no vines access-list 1
```

[no] vines decimal

Displays VINES addresses in decimal notation.

[no] vines host *name address*

Adds or deletes an entry in the VINES name-to-address mapping table. Once entered, a VINES name can be used anywhere that a VINES address is requested.

<i>name</i>	The name of a VINES host. It can be any length.
<i>address</i>	The VINES address expressed in the form <i>network:subnet</i> .

Example

```
vines host STUFF 0027AF92:8001
```

[no] vines route *number address metric*

Specifies a static route to a server.

<i>number</i>	Number of the server to which to add or remove the static route.
<i>address</i>	VINES IP address of the neighbor station to use to reach the server.
<i>metric</i>	Metric value assigned to this route.

[no] vines routing [*address* | **recompute**]

Enables or disables VINES routing.

address (Optional.) Specifies the VINES address of the router. The format is *network:subnet*. The subnet must always be 1.

recompute (Optional.) Dynamically redetermines the router's network address.

Example

```
vines routing 3001082D:1
```

[no] vines time access-group *access-list-number*

Controls the servers from which the router will accept VINES network time.

access-list-number The access list number. It is a number from 201 to 300.

[no] vines time destination *address*

Controls the servers to which the router will send VINES network time. This command can be repeated up to 20 times.

address VINES IP address of the neighbor who should receive time messages.

[no] vines time participate

Controls whether the router participates in the synchronization of time across a VINES network.

[no] vines time set-system

Sets the router's internal time based upon the received VINES network time. To uncouple the router's time from VINES network time, use the **no** form of this command.

[no] vines time use-system

Sets VINES network time based upon the router's internal time. The **no** form uncouples VINES network time from the router's time.

Banyan VINES Interface Configuration Commands

Enter the following commands from within interface configuration mode.

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

Assigns an outgoing VINES access list to the defined interface. The **no** form removes the access list.

access-list-number Number of an access list defined with the **vines access-list** command.

Example

```
vines access-group 2
```

[no] vines arp-enable

Enables or disables the processing of ARP packets received on the defined interface. When enabled, the router responds to ARP packets and assigns network addresses to clients.

[no] vines encapsulation { arpa | snap | vines-tr }

Sets the MAC-level encapsulation used for VINES broadcasts on the defined interface. The current defaults are **arpa** for Ethernet lines, **snap** for IEEE 802.2 media, and **vines-tr** for Token Rings.

[no] vines metric [*number*]

Enables or disables VINES processing on this interface.

number (Optional.) The VINES delay metric, which is used in routing updates. If this argument is not supplied, the system automatically chooses a reasonable metric value based on the interface type and the delay value set for the defined interface.

[no] vines neighbor *address mac-address encapsulation* [*metric*]

Specifies a static path to a neighbor station.

address VINES IP address of the station to which to add or remove a static path.

mac-address MAC-level address used to reach the neighbor station.

encapsulation Encapsulation type to use on the media. It can be one of the following values:

- arpa**—ARPA encapsulation. This is recommended for Ethernet interfaces.
- snap**—IEEE 802.2 SNAP header. This is recommended for FDDI interfaces.
- vines-tr**—Cisco's VINES Token Ring encapsulation. This is recommended for Token Ring interfaces.

metric (Optional.) Delay metric to use on the neighbor. If you omit this argument, the metric used is that specified with the **vines metric** command for the selected interface.

[no] vines propagate

Modifies how routers forward broadcast packets.

[no] vines redirect *[time]*

Determines how frequently a router sends an RTP redirect message on an interface.

time (Optional.) Interval, in seconds, that the router waits after sending a redirect message on an interface before it sends another redirect message on that same interface. If you specify a value of zero, the router never sends redirect messages on that interface.

Example

```
vines redirect 0
```

[no] vines route-cache

Enables fast switching.

[no] vines serverless

Configures a Banyan VINES network without a server. This command can be used on several routes to build a path to a network that contains servers. The **no vines serverless** command is the default.

[no] vines split-horizon

Enables split horizon when sending out routing updates.

[no] vines update deltas

Modifies the manner in which routing updates are sent.

[no] vines update interval *time*

Modifies the frequency at which routing updates are sent.

time Interval, in seconds, between the sending of periodic VINES routing updates. This can be a number in the range 0 to 2^{32} and is rounded up to the nearest 5 seconds. The default is 90. If you omit *time* or specify 0, the default value of 90 seconds is used.

Banyan VINES Show Commands

The following table lists commands that display information about Banyan VINES on your router.

Command	Display
show vines access [<i>access-list-number</i>]	Displays currently defined access lists.
show vines cache [<i>address</i> interface <i>interface</i> neighbor <i>address</i> server <i>network</i>]	Contents of the VINES fast-switching cache table.
show vines host [<i>name</i>]	Contents of the VINES name table.
show vines interface [<i>interface</i> <i>unit</i>]	VINES parameters configured on the interface.
show vines ipc	Information about any currently active IPC connections.
show vines neighbor [<i>address</i> interface <i>interface</i> server <i>number</i>]	Contents of the VINES neighbor table maintained by this router.
show vines route [<i>number</i> neighbor <i>address</i>]	Contents of the VINES routing table.
show vines services	Information about the router's current time.
show vines traffic [<i>interface</i> <i>unit</i>]	Statistics kept about VINES protocol traffic.

DECnet EXEC Command

Enter the following DECnet command from within EXEC mode.

ping decnet {*host* | *address*}

Sends DECnet echo packets to test the reachability of a remote host over a DECnet network.

decnet	DECnet protocol keyword.
<i>host</i>	DECnet host name of system to ping.
<i>address</i>	DECnet address of system to ping.

DECnet Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] access-list *access-list-number* {**permit** | **deny**} *source source-mask*

Creates a standard access list.

<i>access-list-number</i>	An integer you choose between 300 and 399 that uniquely identifies the access list.
permit	Allows access when there is an address match.
deny	Disallows access when there is an address match.
<i>source</i>	The source address. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All addresses are in decimal.
<i>source-mask</i>	The mask to be applied to the address of the source node. Bits are set wherever the corresponding bits in the address should be ignored. All masks are in decimal.

Examples

```
access-list 300 deny 4.51 0.0
access-list 300 permit 2.31 0.0
```

[no] access-list *access-list-number* {**permit** | **deny**} *source source-mask destination destination-mask*

Creates an extended access list.

<i>access-list-number</i>	An integer you choose between 300 and 399 that uniquely identifies the access list.
permit	Allows access when there is an address match.
deny	Disallows access when there is an address match.
<i>source</i>	The source address. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All addresses are in decimal.
<i>source-mask</i>	The mask to be applied to the address of the source node. All masks are in decimal.
<i>destination</i>	The optional destination node's DECnet address in decimal format. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50.
<i>destination-mask</i>	The optional destination mask. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. Masks are in decimal.

[no] access-list *access-list-number* {**permit** | **deny**} *source source-mask destination destination-mask {eq | neq} [[source-object] [destination-object] [identification]] [any]*

Creates an access list that filters *connect initiate* packets.

In this command, the optional argument *source-object* consists of the following string:

src [{**eq** | **neq** | **gt** | **lt**} *object-number*] [**exp** *regular expression*]
[**uic** [*group, user*]]

The optional argument *destination-object* consists of the following string:

dst [{**eq** | **neq** | **gt** | **lt**} *object-number*] [**exp** *regular expression*]
[**uic** [*group, user*]]

The optional argument *identification* consists of the following string:

[**id** *regular expression*] [**password** *regular expression*] [**account**
regular expression]

<i>access-list-number</i>	An integer you choose between 300 and 399 that uniquely identifies the access list.
permit	Allows access when there is an address match.
deny	Disallows access when there is an address match.
<i>source</i>	The source address. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50.
<i>source-mask</i>	The mask to be applied to the address of the source node.
<i>destination</i>	The optional destination node's DECnet address in decimal format. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50.
<i>destination-mask</i>	The optional destination mask. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50.
eq neq	Use either of these keywords: eq —specifies that the item matches the packet if <i>all</i> of <i>source-object</i> , <i>destination-object</i> , and <i>identification</i> match data in the packet. neq —specifies that the item matches the packet if <i>any</i> of the specified parts do <i>not</i> match the corresponding entry in the packet.

source-object Contains the mandatory keyword **src** and the following optional keywords:

- eq** | **neq** | **lt** | **gt**—equal to, not equal to, less than, or greater than. Must be followed by the variable *object-number*, a numeric DECnet object number.
- exp**—stands for expression; followed by a regular expression that matches a string.
- uic**—stands for user identification code; followed by a numeric user ID (UID) expression. The argument [*group, user*] is a numeric UID expression. In this case, the bracket symbols are literal; they must be entered. The group and user parts can either be specified in decimal, in octal by prefixing the number with a 0, or in hex by prefixing the number with 0x. The uic expression is displayed in show displays as an octal number.

<i>destination-object</i>	<p>Contains the mandatory keyword dst and the following optional keywords:</p> <p>eq neq lt gt—equal to, not equal to, less than, or greater than. Must be followed by the variable <i>object-number</i>, a numeric DECnet object number.</p> <p>exp—stands for expression; followed by a regular expression that matches a string.</p> <p>uic—stands for user identification code; followed by a UID expression. In this case, the brackets are literal; they must be entered. The group and user parts can be specified in decimal, in octal by prefixing the number with a 0, or in hex by prefixing the number with 0x. The uic expression is displayed in show displays as an octal number.</p>
<i>identification</i>	<p>Uses any of the following keywords and arguments:</p> <p>id—Regular expression; refers to user ID.</p> <p>password—Regular expression; the password to the account.</p> <p>account—Regular expression; the account string.</p>
any	<p>(Optional.) The item matches if <i>any</i> of the specified parts <i>do</i> match the corresponding entries for <i>source-object</i>, <i>destination-object</i>, or <i>identification</i>.</p>

Examples

```

access-list 300 permit 0.0 63.1023 eq dst eq 27
access-list 300 permit 0.0 63.1023 neq dst eq 17
access-list 300 permit 0.0 63.1023 eq id^SYSTEM$
access-list 300 permit 1.0 0.1023 eq src exp
^SYSTEM$ dst eq 27
access-list 300 permit 0.0 0.1023 eq any

```

[no] decnet advertise *decnet-area* [**cost**] [**hops**]

Configures border routers to propagate Phase IV areas through an OSI backbone.

<i>decnet-area</i>	A Phase IV area that you want propagated.
cost	(Optional.) Cost to be associated with the route being advertised. Default is 0.
hops	(Optional.) Hop count associated with the route being advertised. Default is 0.

decnet [*network-number*] **area-max-cost** *value*

Sets the maximum cost specification value for *interarea* routing.

<i>network-number</i>	(Optional.) Network number in the range 0 to 3, with a default of 0. Specified when using address translation gateway (ATG).
<i>value</i>	Determines the maximum cost for a route to a distant area that the router may consider usable; the router treats as unreachable any route with a cost greater than the value you specify. A valid range for cost is from 1 to 1022. This parameter is only valid for area routers. The default is 1022.

Example

```
decnet area-max-cost 500
```

decnet [*network-number*] **area-max-hops** *value*

Sets the maximum hop count value for *interarea* routing.

<i>network-number</i>	(Optional.) Network number in the range 0 to 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.
<i>value</i>	Determines the maximum number of hops for a usable route to a distant area. The router treats as unreachable any route with a count greater than the value you specify. A valid range for the hop count is from 1 to 30. The default is 30.

Example

```
decnet area-max-hops 21
```

decnet conversion *nsap-prefix*

Enables conversion.

<i>nsap-prefix</i>	Value used for the IDP when constructing NSAPs from a Phase IV address.
--------------------	---

Example

```
decnet conversion 47.0004.004d
```

decnet *first-network* **map** *virtual-address* *second-network* *real-address*

Establishes a translation entry to translate a virtual DECnet address to a real DECnet address for the ATG.

<i>first-network</i>	First DECnet network number, in the range 0 to 3.
----------------------	---

<i>virtual-address</i>	Numeric DECnet address that you want to translate to a real address.
<i>second-network</i>	Second DECnet network number, in the range 0 to 3.
<i>real-address</i>	Real DECnet address to which you want to translate the virtual address.

Example

```
decnet 0 map 19.5 1 50.1
```

decnet [*network-number*] **max-address** *value*

Configures the router with a maximum number of node addresses.

<i>network-number</i>	(Optional.) Network number in the range 0 to 3, with a default of 0. Specified when using address translation gateway (ATG).
<i>value</i>	A number less than or equal to 1023 that represents the maximum node address possible on the network. All routers on the network should use the same value for this parameter. The default is 1023.

Example

```
decnet max-address 1020
```

decnet [*network-number*] **max-area** *value*

Sets the largest number of areas that the router can handle in its routing table.

<i>network-number</i>	(Optional.) Network number in the range 0 to 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.
<i>value</i>	An area number from 1 to 63. Like the decnet max-address global configuration command value, this parameter controls the sizes of internal routing tables and of messages sent to other nodes. All routers on the network should use the same maximum address value. The default is 63.

Example

```
decnet max-area 30
```

decnet [*network-number*] **max-cost** *value*

Sets the maximum cost specification for *intra-area* routing.

<i>network-number</i>	(Optional.) Network number in the range 0 to 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.
<i>value</i>	A cost from 1 to 1022. The default is 1022.

Example

```
decnet max-cost 500
```

decnet [*network-number*] **max-hops** *value*

Sets the maximum hop count specification value for *intra-area* routing.

<i>network-number</i>	(Optional.) Network number in the range 0 through 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.
<i>value</i>	A hop count from 1 to 30. The router ignores routes that have a hop count greater than the corresponding value of this parameter. The default is 30.

Example

```
decnet max-hops 30
```

decnet [*network-number*] **max-paths** *value*

Defines the maximum number of equal cost paths to a destination that the router will keep in its routing table.

<i>network-number</i>	(Optional.) Network number in the range 0 through 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.
<i>value</i>	A decimal number equal to the maximum number of equal cost paths the router will save. The valid range is between 1 and 31. The default is 1.

Example

```
decnet max-paths 2
```


decnet [*network-number*] **max-visits** *value*

Sets the limit on the number of times a packet can pass through a router.

<i>network-number</i>	(Optional.) Network number in the range 0 through 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.
<i>value</i>	The number of times a packet can pass through a router. It can be a decimal number in the range 1 through 63. If a packet exceeds <i>value</i> , the router discards the packet. DEC recommends that the value of the max-visits parameter be at least twice that of the max-hops parameter, to allow packets to still reach their destinations when routes are changing. The default is 63.

Example

```
decnet max-visits 15
```

decnet [*network-number*] **node-type** { **area** | **routing-iv** }

Specifies the node type.

<i>network-number</i>	(Optional.) Network number in the range 0 to 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.
area	Specifies that the router participates in the DECnet routing protocol with other area routers, as described in the DEC documentation, and routes packets from and to routers in other areas. This is sometimes referred to as Level 2, or interarea, routing. An area router does not just handle interarea routing; it also acts as an intra-area or Level 1 router.
routing-iv	Specifies that the router acts as an intra-area (standard DECnet Phase IV, Level 1 router) and ignores Level 2 routing packets. In this mode, it routes packets destined for other areas via the least-cost path to an interarea router, exchanging packets with other end-nodes and routers in the same area.

Example

```
decnet node-type area
```

decnet path-split-mode { **normal** | **interim** }

Sets the mode for splitting the routes between equal cost paths.

normal or interim	Specify normal to make the router select equal cost paths one after the other. Specify interim to make the router route traffic for a single higher-level session over the same path. Always specify interim if the network is running DECnet VMS Version 4.5 or earlier.
---------------------------------	--

Example

```
decnet path-split-mode normal
```

Protocol Configuration

[no] decnet router-priority *value*

Sets a priority value for use in determining the default router. The **no** form restores the default of 64.

value Number between 1 and 127. To configure a router as the designated router, assign it the highest possible node address.

Example

```
decnet router-priority 127
```

[no] decnet [*network-number*] **routing** *decnet-address*

Enables DECnet routing.

network-number (Optional.) Network number in the range 0 through 3. Specified when using address translation gateway (ATG). If not specified, the default is network 0.

decnet-address An address in DECnet format X.Y, where X is the area number and Y is the node number.

Examples

```
no decnet routing 6.1023
decnet routing 6.10
```

DECnet Interface Configuration Commands

Enter the following DECnet commands from within interface configuration mode.

[no] decnet access-group *list*

Interface configuration command that applies or removes an access list.

list Standard or extended DECnet access list. Standard DECnet access lists apply to destination addresses in this command.

Example

```
decnet access-group 389
```

[no] decnet congestion-threshold *number*

Sets the congestion experienced bit if the output queue has more than the specified number of packets in it. A *number* value of zero or the **no** form of the command prevents this bit from being set.

number The number of packets that are allowed in the output queue before the system will set the congestion experience bit. This value is an integer between 0 and 0x7fff. The value zero prevents this bit from being set. Only relatively small integers are reasonable. The default is 1.

[no] decnet cost *cost-value*

Sets or removes a cost value for an interface.

cost-value An integer from 1 to 63. The suggested cost for Ethernet networks is 4. All hosts on the same cable must share the same value.

Example

```
deccnet cost 4
```

deccnet encapsulation {pre-dec | dec}

Configures the router for operation on the same Token Ring with routers running software versions prior to 9.1. Use **pre-dec** for Cisco-style encapsulation; use **dec** to return to the default.

Example

```
interface tokenring 0
deccnet encapsulation pre-dec
deccnet cost 4
```

[no] deccnet hello-timer *value*

Specifies how often the router sends hello messages. The **no** form restores the default of 15 seconds.

value An interval from 1 to 8191 seconds.

Example

```
deccnet hello-timer 120
```

[no] deccnet in-routing-filter *list*

Provides access control to hello messages or routing information received on this interface. The **no** form removes access control.

list Standard DECnet access list.

Example

```
deccnet in-routing-filter 321
```

[no] decnet out-routing-filter *list*

Applies access control to routing information being sent out on this interface. The **no** form removes access control.

list Standard DECnet access list.

Example

```
decnet out-routing-filter 351
```

[no] decnet route-cache

Enables or disables fast switching and the route cache. The **no** form disables fast switching. Default is enabled.

decnet router-priority *value*

Elects a designated router to which packets will be sent when no destination is specified.

value The priority of the router. This can be a number in the range 0 through 127. The greater the number the higher the priority. The default is 64.

[no] decnet routing-timer *value*

Specifies how often the router sends routing messages. The **no** form restores the default of 40 seconds.

value Number of seconds between 1 and 65,535.

Example

```
decnet routing-timer 60
```

DECnet Show Commands

The following commands display information about DECnet functions on your router:

Command	Display
show decnet	Display global DECnet parameters.
show decnet interface [<i>interface unit</i>]	Display global DECnet status and configuration for all interfaces, or the status and configuration for a specified interface.
show decnet map	Address mapping information used by the DECnet address translation gateway.
show decnet route [<i>decnet address</i>]	DECnet routing table.
show decnet traffic	DECnet traffic statistics including datagrams sent, received, and forwarded.

IP and SLIP Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] access-list *access-list-number* {**permit** | **deny**} *source*
[*source-mask*]

Creates or removes a standard IP access list.

<i>access-list-number</i>	An IP list number from 1 to 99.
permit or deny	Specifies permit or deny condition for this list.
<i>source</i>	Compares the source address being tested to this value.
<i>source-mask</i>	(Optional.) Address bits corresponding to wildcard mask bits. Set to 1 are ignored in comparisons. Address bits corresponding to wildcard mask bits set to 0 are used in comparisons.

Example

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

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

Creates or removes an extended IP access list.

<i>access-list-number</i>	An IP list number from 100 to 199.
permit or deny	Specifies permit or deny condition for this list.
<i>protocol</i>	One of the supported protocol keywords: ip , tcp , udp , icmp , igmp , gre , or igrp .
<i>source</i>	An IP address in 32-bit, dotted decimal notation.
<i>source-mask</i>	Mask bits for the source address in 32-bit, dotted decimal notation.
<i>destination</i>	Destination address in 32-bit, dotted decimal notation.
<i>destination-mask</i>	Destination address mask in 32-bit, dotted decimal notation.
<i>operator</i>	(Optional.) 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).
<i>operand</i>	(Optional.) If tcp or udp is the protocol, specify the decimal destination port for the specified protocol.
established	(Optional.) For the TCP protocol, use the established keyword to match TCP datagrams that have the ACK or RST bits set.

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.

<i>ip-address</i>	The Internet address that corresponds to the local data-link address specified by the argument <i>hardware-address</i> .
<i>hardware-address</i>	Local data-link address.
<i>type</i>	Encapsulation description: arpa for Ethernet interfaces, and snap for FDDI and Token Ring interfaces.
alias	(Optional.) Supply this keyword if the router should respond to ARP requests as if it were the owner of the specified IP address.

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 entered, by default the software generates a gateway and subnet mask appropriate for the local network.

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 <i>:hostname</i> and <i>data</i> 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 <i>offset</i>	A signed 32-bit integer specifying the time offset of the local subnetwork in seconds from Universal Time Coordinated (UTC).
gateway <i>address</i>	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 <i>address</i>	Dotted decimal address specifying the IP address of Resource Location Protocol (RLP) servers (as defined in RFC 887).
hostname <i>name</i>	The name of the client, (which may or may not be domain qualified, depending upon the site).
bootfile-size <i>value</i>	A two-octet value specifying the number of 512-octet (byte) blocks in the default boot file.
<i>:hostname</i>	Host to which this entry applies, expressed as either an IP address or logical host name.
<i>data</i>	List of IP addresses entered in dotted decimal notation or as logical host names, a number, or a quoted string.

Examples

```
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.

<i>ip-address</i>	IP address for the host.
<i>mask</i>	Mask with which the source and destination address of each IP datagram is logically ANDed to determine whether there is a match.

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.

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.

Example

```
ip accounting-transits 100
```

[no] ip cache-invalidate-delay [*minimum maximum quiet threshold*]

Controls the invalidation rate of the IP route cache.

minimum (Optional.) Minimum time in seconds between invalidation request and actual invalidation. The default is 2 seconds.

maximum (Optional.) Maximum time in seconds between invalidation request and actual invalidation. The default is 5 seconds.

quiet (Optional.) Length of quiet period, in seconds, before invalidation.

threshold (Optional.) Maximum number of invalidation requests considered to be quiet.

[no] ip default-gateway *address*

Sets up a default gateway (router).

address Internet address of the router.

[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.

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-lookup nsap

Allows Domain Name System (DNS) queries for CLNS addresses.

[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.

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.
<i>port</i>	(Optional.) If you specified UDP protocol, optionally specify a UDP destination port to control which UDP services are forwarded.

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 forward-protocol turbo-flood

Speeds up flooding of UDP datagrams using the spanning-tree algorithm.

[no] ip host name [tcp-port-number] ip-address1 | [ip-address2... ip-address8]

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

<i>name</i>	Host name.
<i>tcp-port-number</i>	(Optional.) TCP port number. Default is 23 (Telnet).
<i>ip-address</i>	IP address associated with the host name. Up to eight addresses can be supplied.

Protocol Configuration

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.

Example

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

[no] ip name-server *server-address1 [server-address2...server-address6]*

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.

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.

[no] ip tcp synwait-time *seconds*

Sets a specified period of time the router will wait to attempt to establish a TCP connection before it times out.

seconds The number of seconds.

IP Interface Configuration Commands

Enter the following IP commands in interface configuration mode.

[no] arp {arpa | probe | snap}

Controls the interface-specific handling of IP address resolution into 48-bit Ethernet, FDDI, 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.

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.

Example

```
arp timeout 7200
```

[no] ip access-group *access-list-number* {**in** | **out**}

Controls access to an interface.

access-list-number Standard or extended IP access list number from 1 to 199.

in Filter on inbound packets.

out Filter on outbound packets.

Example

```
access-group 101
```

[no] ip accounting

Enables or disables IP accounting on an interface.

[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 (Optional.) IP broadcast address for the network.

Example

```
ip broadcast-address 121.24.43.2
```

[no] ip directed-broadcast [*access-list-number*]

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

access-list-number (Optional.) Number of the access list.

[no] ip gdp gdp

Configures the router discovery feature using the Cisco GDP routing protocol.

[no] ip gdp igrp

Configures the router discovery feature using the Cisco IGRP routing protocol.

[no] ip gdp irdp

Configures the router discovery feature using the Cisco IRDP routing protocol.

[no] ip gdp rip

Configures the router discovery feature using the UNIX RIP routing protocol.

[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.

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 to one less than the maximum for the interface.

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 [cbus]

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.

cbus (Optional.) Enables autonomous switching.

[no] ip route-cache same-interface

Controls the use of outgoing packets on a high-speed switching cache for IP routing.

same-interface Enables fast switching packets back out the interfaces on which they arrived.

[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.

[no] ip security dedicated level authority [authority...]

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

level The degree of sensitivity of information. The *level* keywords are listed in the Level Keyword table.

authority The organization that defines the set of security levels that will be used in a network. The *authority* keywords are listed in the Authority Keyword table.

Level Keyword	Bit Pattern
Reserved4	0000 0001
TopSecret	0011 1101
Secret	0101 1010
Confidential	1001 0110
Reserved3	0110 0110
Reserved2	1100 1100
Unclassified	1010 1011
Reserved1	1111 0001

Authority Keyword	Bit Pattern
Genser	1000 0000
Siop-Esi	0100 0000
DIA	0010 0000
NSA	0001 0000
DOE	0000 1000

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 (Optional.) Degree of sensitivity of information: **Reserved4, TopSecret, Secret, Confidential, Reserved3, Reserved2, Unclassified, or Reserved1.**

authority (Optional.) Organization that defines the set of security levels that will be used in a network: **Genser, Siop-Esi, DIA, NSA, or DOE.**

Example

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

ip security multilevel *level1* [*authority1...*] **to** *level2* *authority2* [*authority2...*]

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, Siop-Esi, DIA, NSA, or DOE.**

Example

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

[no] ip security reserved-allowed

Treats as valid any packets that have Reserved1 through Reserved4 security levels.

[no] ip security strip

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

[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 to 256.

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 (Optional.) Sets the interface to compress outgoing traffic on the interface only when incoming traffic is compressed.

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.

Example

```
ip unnumbered ethernet 0
```

[no] ip unreachable

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

[no] transmit-interface [*interface-name*]

Assigns a transmit interface to a receive-only interface.

interface-name (Optional.) Name of the interface to which you want to convert the interface designated as the source of the route.

Example

```
transmit-interface ethernet 0
```


IP Line Configuration Command

Enter the following command from within line configuration mode.

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

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

access-list-number An integer from 1 to 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.

Example

```
access class 23 in
```

IP and SLIP EXEC Commands

Enter the following commands from within EXEC mode.

ping ip {*host* | *address*} (privileged and user)

Sends ICMP *Echo* messages to check host reachability and network connectivity. If the router receives an ICMP *Echo* message, it sends an ICMP *Echo Reply* message to the source of the ICMP *Echo* message.

host Host name of system to ping.

address IP address of system to ping.

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

Begins a SLIP connection.

default Connect using assigned default address.

address Connect using a specific address.

Examples

```
slip 131.108.2.5  
slip default
```

trace [*destination*] (privileged)

Discovers the routes the router's packets will actually take when traveling to the destination.

destination (Optional.) Destination address or host name on the command line. The default parameters for the appropriate protocol are assumed and the tracing action begins.

trace ip *destination* (user)

Discovers the IP routes the router's packets will actually take when traveling to their destination.

destination Destination address or host name on the command line. The default parameters for the appropriate protocol are assumed and the tracing action begins.

Serial Line IP (SLIP) Line Configuration Commands

Enter the following commands from within line configuration mode.

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.

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.

- ip-address* (Optional.) Internet address. Allows a default address to be specified upon access.

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.

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 that were received from the network and are waiting to be sent to the SLIP client. Default is 2.

packets Maximum number of packets.

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.

byte Maximum number of bytes.

Example

```
slip mtu 3000
```

speed *baud*

Sets the transmit and receive speeds for the line.

baud 100, 1200, 2400, 4800, 9600, 19200, or 38400.

Protocol Configuration

Example

```
speed 9600
```

IP Routing Protocols Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] autonomous-system *local-AS*

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

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

Example

```
autonomous-system 109
```

[no] ip as-path access-list *access-list-number* {**permit** | **deny**} *as-regular-expression*

Defines a BGP-related access list.

access-list-number Number of the access list.

permit or **deny** Specifies the permit or deny condition.

as-regular-expression A regular expression as described in the **x25 route** command.

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 Number of the network.

Example

```
ip default-network 128.99.0.0
```

[no] ip ospf-name-lookup

Configures OSPF to look up Domain Name System (DNS) names for use in all OSPF **show** command displays.

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

Establishes static routes.

network Network address.
mask (Optional.) Network mask.
address Neighbor network address (next hop).
interface Network interface.
distance (Optional.) Administrative distance.

Example

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

[no] route-map *map-tag* {**permit** | **deny**} [*sequence-number*]

Use this command, and route-map configuration commands **match** and **set**, to define the conditions for redistributing routes from one routing protocol into another. Each **route-map** command has a list of **match** and **set** commands associated with it. See the later section “IP Routing Protocols Route-map Configuration Commands.”

<i>map-tag</i>	Defines a meaningful name for the route map. The redistribute command uses this name to reference this route map.
permit	If the match criteria are met for this route map, and permit is specified, the route is redistributed as controlled by the set actions. If the match criteria are not met, and permit is specified, the next route map with the same map-tag is tested. If a route passes none of the match criteria, it is not redistributed by that set.
deny	If the match criteria are met for the route map, and deny is specified, the route is not redistributed, and no further route maps sharing the same map tag name will be examined.
<i>sequence-number</i>	(Optional.) A number that indicates the position a new route map is to have in the list of route maps already configured with the same name. If given with the no form of the command, it specifies the position of the route map that should be deleted.

[no] router protocol [{*autonomous-system* | *tag*}]

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

<i>protocol</i>	Protocol-type keyword: rip , egp , bgp , igrp , or isis .
<i>autonomous-system</i>	(Optional.) For IGRP, BGP, or EGP protocols only: the number of an autonomous system.
<i>tag</i>	(Optional.) Defines a meaningful name for a routing process for ISIS.

Examples

```
router igrp 120
router hello
```

[no] router egp 0

A specific version of the **router** global configuration command that specifies a core gateway. Allows a specific router to have an EGP process that will enable it to behave like a peer to any reachable autonomous system.

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

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

<i>ospf-process-id</i>	An internally used identification parameter expressed as a positive integer.
------------------------	--

Example

```
router ospf 109
```


IP Routing Protocols Route-map Configuration Commands

The following commands are **match** commands for the **route-map** global configuration command. This command has multiple formats. The **match** commands may be given in any order, and all **match** commands must “pass” to cause the route to be redistributed according to the *set actions* given with the **set** commands.

The **set** route-map commands specify the redistribution *set actions* to be performed when all of a route map’s match criteria are met. When all match criteria are met, all set actions are performed.

[no] match ip address *access-list-number* [*access-list-number...access-list-number*]

Use this form of the **match** command for any routes with address specified by a standard access list.

ip address Any routes with the network address passed by one or more of the standard access lists specified will be redistributed.

access-list-number One or more numeric identifiers of access lists.

[no] match interface *name unit* [*name unit...name unit*]

Use this form of the **match** command for any routes which have their next hop out one of the interfaces specified.

interface Any routes that have their next hop out one of the interfaces specified will be redistributed.

name unit Names of interfaces, such as Ethernet 0 or Serial 2.

[no] match metric *metric-value*

Use this form of the **match** command for any routes with the metric specified.

metric	Any routes with the metric specified will be redistributed.
<i>metric-value</i>	A route metric. This may be an IGRP five-part metric.

[no] match ip next-hop *access-list-number* [*access-list-number...*
access-list-number]

Use this form of the **match** command for any routes that have a next-hop router address passed by one of the access lists specified.

next-hop	Any routes that have a next-hop router address passed by one of the access lists specified will be redistributed.
<i>access-list-number</i>	One or more numeric identifiers of standard access lists.

[no] match ip route-source *access-list-number* [*access-list-number...*
access-list-number]

Use this form of the **match** command for any routes that have been advertised by routers at the address specified by the access lists.

route-source	Any routes that have been advertised by routers at address specified by the access lists will be redistributed.
<i>access-list-number</i>	One or more numeric identifiers of standard access lists.

[no] match route-type { internal | external | level-1 | level-2 }

Use this form of the **match** command for any routes which are of the specified type.

route-type	Any routes that are of the specified type will be redistributed.
internal	OSPF intra-area and interarea routes or Enhanced IGRP internal routes.
external	OSPF external type-1 or type-2 routes, or Enhanced IGRP external routes.
level-1	IS-IS Level 1 routes.
level-2	IS-IS Level 2 routes.

[no] match tag tag-value [tag-value...tag-value]

Use this form of the **match** command for any routes stored in the routing table with one of the tags specified.

tag	Any routes stored in the routing table with one of the tags specified will be redistributed.
<i>tag-value</i>	A list of one or more route tags.

[no] set ip destination access-list-number

Use this form of the **set** command to provide a mechanism to perform conditional route aggregation as well as conditional default route advertisements.

destination	An NSAP of a “route” to advertise instead of the one under consideration. This provides a mechanism to perform conditional route aggregation as well as conditional default route advertisements. There is no default value.
<i>access-list-number</i>	Access list number (usually just one line long) that specifies the network to advertise.

[no] set level {level-1 | level-2 | level-1-2 | stub-area | backbone}

Use this form of the **set** command for routes that are advertised into this specified area of the routing domain.

level	Redistributed routes are advertised into this specified area of the routing domain. For IS-IS destinations, the default value is level-2 . For OSPF destinations, the default value is backbone .
level-1	Inserted in IS-IS Level 1 LSPs.
level-2	Inserted in IS-IS Level 2 LSPs.
level-1-2	Inserted into both Level 1 and Level 2 IS-IS LSPs.
stub-area	Inserted into OSPF Not So Stubby Areas (NSSA).
backbone	Inserted into OSPF as External LSAs.

[no] set metric *metric-value*

Use this form of the **set** command to set the metric value to give the redistributed routes.

metric	The metric value to give the redistributed routes. There is no default value.
<i>metric-value</i>	A route metric. This can be an IGRP five-part metric.

[no] set metric-type {internal | external | type-1 | type-2}

Use this form of the **set** command to set the metric type to give redistributed routes.

metric-type	The metric type to give redistributed routes. There is no default value.
internal	IS-IS internal metric.
external	IS-IS external metric.
type-1	OSPF type-1 metric.
type-2	OSPF type-2 metric.

[no] set tag *tag-value*

Use this form of the **set** command to set a tag value to associate with the redistributed routes.

tag A tag value to associate with the redistributed route. If not specified, the default action is to forward the tag in the source routing protocol onto the new destination protocol.

tag-value A name for the tag.

IP Routing Protocols Interface Configuration Commands

[no] ip address *address mask* [**secondary**]

Specifies or removes the IP address on an interface.

address IP address to be added or removed.

mask IP address mask.

secondary (Optional.) Address to be added as a secondary address.

[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.

Example

```
ip gdp holdtime 20
```

[no] ip gdp priority *number*

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

number Priority number.

Example

```
ip gdp priority 95
```

[no] ip gdp reporttime *seconds*

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

seconds Report time.

Example

```
ip gdp reporttime 10
```

[no] ip irdp

Enables or disables ICMP Router Discover Protocol (IRDP) processing on an interface. Default is disabled. When enabled, default values are used. These values are shown in the following table:

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.

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.

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. Changing this parameter causes a change to the parameter set by the command **ip irdp minadvertinterval**.

seconds Interval in seconds.

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.

Example

```
ip irdp minadvertinterval 100
```

[no] ip irdp multicast

Use the multicast address (224.0.0.1) instead of IP broadcasts.

[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.

Example

```
ip irdp preference 50
```

[no] ip ospf authentication-key *password*

Assigns or cancels a password to be used by neighboring routers on a wire that employs OSPF's simple password authentication.

password Password you enter from the keyboard for authentication. It can be up to 8 bytes in length.

Example

```
ip ospf authentication-key yourpass
```

Protocol Configuration

[no] ip ospf cost *cost*

Specifies or resets to default values 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:

$$\frac{10^8}{\textit{Bandwidth}}$$

The following table lists the media types supported and their 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
16-Mbps Token Ring	6
FDDI	1

[no] ip ospf dead-interval *number-of-seconds*

Sets or resets to the default value the number of seconds that the router waits in the absence of Hello packets from the neighbor router before declaring the neighbor 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-second Unsigned integer value.

Example

```
is ospf dead-interval 60
```

[no] ip ospf hello-interval *number-of-seconds*

Sets or resets to the default value 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-second Unsigned integer value.

Example

```
is ospf hello-interval 15
```

[no] ip ospf network { broadcast | non-broadcast }

Configures the OSPF network type to a type other than the default for a given media.

broadcast Sets the network type to broadcast.

non-broadcast Sets the network type to nonbroadcast.

[no] ip ospf priority *number*

Establishes or cancels a Router Priority, which helps determine the Designated Router for a network. Default is one.

number 8-bit unsigned integer.

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.

Example

```
ip ospf retransmit-interval 7
```

[no] ip ospf transmit-delay *number-of-seconds*

Sets or resets to default values 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.

Example

```
ip ospf transmit-delay 2
```

[no] ip router isis [*tag*]

Configures an IS-IS routing process for IP over an interface.

tag (Optional.) Defines a meaningful name for a routing process.

[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] isis circuit-type {level-1 | level-1-2 | level-2-only}

Configures the type of adjacency desired for the specified interface. The **no isis circuit-type** command resets the circuit type to Level 1 and Level 2.

- | | |
|---------------------|---|
| level-1 | Level 1 adjacency can be established if there is at least one area address in common between this system and its neighbors. |
| level-1-2 | Level 1 and 2 adjacency is established if the neighbor is also configured as level-1-2 and there is at least one area in common. If there is no area in common, a Level 2 adjacency is established. This is the default. |
| level-2-only | Level 2 adjacency is established if and only if the neighbor is configured exclusively to be a Level 2 router. |

[no] isis csnp-interval *seconds* {level-1 | level-2}

Configures the IS-IS Complete Sequence Number PDUs (CSNP) interval for the specified interface.

Use the **is-type** router configuration command to configure the level at which the router will operate. The **no is-type** router configuration command resets the parameter to the default.

- | | |
|----------------|--|
| <i>seconds</i> | Interval of time between transmission of CSNPs on multiaccess networks. This interval only applies for the designated router. The default is 10 seconds. |
| level-1 | Configures the interval of time between transmission of CSNPs for Level 1 independently. |
| level-2 | Configures the interval of time between transmission of CSNPs for Level 2 independently. |

[no] isis hello-interval *seconds* {**level-1** | **level-2**}

Specifies the length of time, in seconds, between Hello packets that the router sends on the specified interface.

<i>seconds</i>	Unsigned integer value. A value three times the Hello interval <i>seconds</i> is advertised as the <i>holdtime</i> in the Hello packets transmitted. It must be the same for all routers attached to a common network. With smaller Hello intervals, topological changes are detected faster, but there is more routing traffic. The default is 10 seconds.
level-1	Configures the Hello interval for Level 1 independently. Use this on X.25, SMDS, and Frame Relay multiaccess networks.
level-2	Configures the Hello interval for Level 2 independently. Use with X.25, SMDS, and Frame Relay multiaccess networks.

[no] isis metric *default-metric* [*delay-metric* [*expense-metric error-metric*]] {**level-1** | **level-2**}

Configures the metric (or cost) for the specified interface.

<i>default-metric</i>	Metric used for the redistributed route. The range is from 0 to 63. The default value is 10.
<i>delay-metric</i>	Not supported.
<i>expense-metric</i>	Not supported.
<i>error-metric</i>	Not supported.
level-1	The router acts as a Level 1 station router only.
level-2	The router acts as a Level 2 area router only.

[no] isis password *password* {level-1 | level-2}

Configures the authentication password for a specified interface.

- | | |
|-----------------|--|
| <i>password</i> | Authentication password you assign for an interface. |
| level-1 | Configures the authentication password for Level 1 independently. For Level 1 routing, the router acts as a station router only. |
| level-2 | Configures the authentication password for Level 2 independently. For Level 2 routing, the router acts as an area router only. |

[no] isis retransmit-interval *seconds*

Configures the number of seconds between retransmission of IS-IS link-state PDU (LSP) retransmission for point-to-point links.

- | | |
|----------------|---|
| <i>seconds</i> | Integer that should be greater than the expected round-trip delay between any two routers on the attached network. The setting of this parameter should be conservative, or needless retransmission will result. The value should be larger for serial lines and virtual links. The default value is 5 seconds. |
|----------------|---|

[no] isis priority *value* {level-1 | level-2}

Configures the priority of designated routers.

- | | |
|----------------|--|
| <i>value</i> | Priority of a router; a number from 0 through 127. The default <i>value</i> is 64. |
| level-1 | Sets priority of a router for Level 1 independently. |
| level-2 | Sets priority of a router for Level 2 independently. |

[no] keepalive [*seconds*]

Sets the keepalive timer for a specific interface.

seconds (Optional.) Unsigned integer value greater than 0.
The default is 10 seconds.

Example

```
interface ethernet 0
keepalive 3
```

IP Routing Protocols Router Configuration Commands

Enter the following commands from within router configuration mode.

[no] area *area-id* authentication

Enables and disables authentication for an area; for OSPF only. The authentication must be consistent on all routers in an area.

area-id The area ID of the area for which authentication is to
be enabled.

Example

```
area 12 authentication
```

[no] area *area-id* stub

[no] area *area-id* default-cost *cost*

For OSPF only. Specifies an area as a stub area. The area border router sends a default route into the stub area at the cost specified by the **area default-cost** command. This command must be specified on all routers attached to this area.

<i>area-id</i>	Area ID for the stub area specified as either a decimal value or an IP address.
<i>cost</i>	Cost for the default external route used for the stub area expressed as a 32-bit number.

Examples

```
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.

<i>area-id</i>	Area ID for the area about which routes are to be summarized specified as either a decimal value or an IP address.
<i>ip-address</i>	Standard IP address.
<i>mask</i>	Standard IP mask.

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.

<i>area-id</i>	Area ID assigned to the transit area for the virtual link.
<i>router-id</i>	Router ID associated with the virtual link neighbor.
<i>number-of-seconds</i>	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.
<i>8-bytes-of-password</i>	String of characters that you can enter from the keyboard up to 8 bytes in length.

[no] area-password *password*

Configures the area authentication password.

[no] default-information allowed {**in** | **out**}

Controls the handling of default information between multiple IGRP processes. Default is enabled. 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.

Example

```
no default-information allowed out
```

[no] default-information originate

Configures EGP to generate a default route. If the next hop for the default route can be advertised as a third party, it is included as a third party.

[no] default-information originate [always] [metric *metric-value*]
[metric-type *type-value*] {level-1 | level-1-2 | level-2} [route-map
***map-name*]**

Generates a default route into an OSPF or IS-IS routing domain. The **no default-information originate** command disables generation of a default route into the specified OSPF or IS-IS routing domain.

originate	For OSPF, generates a default external route into an OSPF domain if the router already has a default route. For IS-IS, originates the default route whether or not it resides in the routing table.
always	(Optional.) For OSPF, the default route always will be advertised whether or not the router has a default route.
metric <i>metric-value</i>	(Optional.) Metric used for the generating the default route. The default metric value is 0. The value used is specific to the protocol.
metric-type <i>type-value</i>	(Optional.) For OSPF, the external link type associated with the default route advertised into the OSPF routing domain (1 or 2 [the default]). For IS-IS, it can be either internal (the default, which is < 63) or external (> 64 < 128).
level-1	For IS-IS only, Level 1 routes are redistributed into other IP routing protocols independently.
level-1-2	For IS-IS only, both Level 1 and Level 2 routes are redistributed into other IP routing protocols.
level-2	For IS-IS only, Level 2 routes are redistributed into other IP routing protocols independently.
route-map <i>map-name</i>	(Optional.) Routing process will generate the default route if the route-map is satisfied.

Example

```
default-information originate metric 100  
metric-type 1
```

default-metric *bandwidth delay reliability loading mtu*

Sets metrics for IGRP only.

<i>bandwidth</i>	Maximum bandwidth of the route in kilobits per second.
<i>delay</i>	Route delay in tens of microseconds.
<i>reliability</i>	Likelihood of successful packet transmission expressed as a number between 0 and 255 where 255 is 100 percent reliability.
<i>loading</i>	Effective bandwidth of the route in kilobits per second.
<i>mtu</i>	Minimum Maximum Transmission Unit (MTU) of the route.

Example

```
default-metric 10000 2000 254 1 1500
```

[no] default-metric *number*

Sets metrics for RIP, EGP, BGP, and HELLO, which use scalar, single-valued metrics.

<i>number</i>	Default metric value appropriate for the specified routing protocol expressed as an unsigned integer.
---------------	---

Example

```
default-metric 10000
```

[no] distance weight [address-mask] [access-list-number] [ip]

Configures the administrative distance for IP routes learned.

<i>weight</i>	Integer from 10 to 255 that specifies a default administrative distance that the router uses when no other specification exists for a routing information source.
<i>address-mask</i>	(Optional.) A mask that specifies which bits, if any, to ignore in the address value in dotted-decimal format.
<i>access-list-number</i>	(Optional.) Number of a standard IP access list.
ip	(Optional.) IP-derived routes for IS-IS. Can be applied independently for IP routes and ISO CLNS routes.

Example

```
distance 90 192.31.7.0 0.0.0.255
```

[no] distance bgp external-distance internal-distance local-distance

Specifies administrative distance.

<i>external-distance</i>	Value for BGP external routes. Default is 20.
<i>internal-distance</i>	Value for BGP internal routes. Default is 200.
<i>local-distance</i>	Value for BGP local routes. Default is 200.

Example

```
distance bgp 40 200 200
```

[no] distribute-list *access-list-number* **in** [*interface-name*]

Filters networks received in updates, or cancels the filter.

<i>access-list-number</i>	Standard IP access list number.
<i>interface-name</i>	(Optional.) Interface on which the access list should be applied to incoming updates. If no interface is specified, the access list is applied to all incoming updates.

Example

```
distribute-list 1 in Ethernet 0
```

[no] distribute-list *access-list-number* **out** { *interface-name* | *routing-process* }

Specifies the networks to be included in updates.

<i>access-list-number</i>	Standard IP access list number.
<i>interface-name</i> or <i>routing-process</i>	To restrict the routing updates sent to a specific interface, specify the interface. To redistribute networks, specify the routing process name.

Example

```
distribute-list 3 out igrp 109
```

[no] domain-password *password*

Configures the routing domain authentication password.

[no] is-type {level-1 | level-1-2 | level-2-only }

Configures the IS-IS level at which the router will operate.

- | | |
|---------------------|---|
| level-1 | Router acts as a station router. |
| level-1-2 | Router acts as both a station router and an area router. This is the default. |
| level-2-only | Router acts as an area router only. |

[no] metric holddown

For IGRP only. Disables or reenables 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.

- | | |
|-------------|--|
| <i>hops</i> | Hop count from 1 to 255. Default is 100. |
|-------------|--|

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).

- | | |
|--------------|--|
| <i>tos</i> | Use the parameter 0. |
| <i>k1-k5</i> | 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. |

[no] neighbor *ip-address*

Creates a list of neighbor routers for EGP, BGP, IGRP, and RIP.

ip-address IP address of a peer router with which routing information will be exchanged.

[no] neighbor *ip-address* **distribute-list** *list* {**in** | **out**}

Distributes neighbor information as specified in an address list for BGP.

ip-address IP address of the neighbor router.

list Access list to be applied to incoming or outgoing updates.

in or **out** If the access list is to be applied to incoming updates, use the keyword **in**. If the access list is to be applied to outgoing updates, use the keyword **out**.

Examples

```
neighbor 192.31.7.0 distribute-list 41 out
neighbor 120.23.4.1 distribute-list 39 in
```

[no] neighbor *ip-address* **ebgp-multihop**

Accepts and attempts BGP connections to external peers residing on networks that are not directly connected. Use the **no** form of the command to return to the default of allowing only directly connected neighbors.

ip-address IP address of the BGP-speaking neighbor.

ebgp-multihop Allow connections to or from external BGP neighbors residing on networks not directly connected to the router.

[no] neighbor *ip-address* **filter-list** *access-list-number* {**in** | **out** | **weight** *weight*}

Sets up BGP filters, using access lists defined with the **ip as-path access-list** command.

<i>ip-address</i>	IP address of the neighbor router.
<i>access-list-number</i>	Autonomous system number of the neighbor routers that you want to filter.
in	Access list to incoming routes.
out	Access list to outgoing routes.
weight <i>weight</i>	Assigns a relative importance to matching routers. The default value is 32. Acceptable values are 1 through 255.

Example

```
neighbor 120.23.4.1 filter-as 20 permit 60
```

[no] neighbor *template-name* **neighbor-list** *ip-access-list-number*

Configures BGP to support anonymous neighbor peerings by configuring a neighbor template. Use the **no** form of this command to delete the template, and also cause any temporary neighbors accepted by the template to be shut down and removed.

<i>template-name</i>	Requests that the router treat peers learned through a template as if they were manually configured neighbors.
<i>ip-access-list-number</i>	Number of the IP access list that defines remote systems.

Example

```
access-list 7 permit 168.89.3.0 0.0.0.255  
neighbor internal-ethernet neighbor-list 7
```


[no] neighbor *template-name* configure-neighbors

Instructs the router to treat temporary neighbors that have been accepted through a template as though they had been configured by hand.

<i>template-name</i>	A user-selectable designation that identifies a particular template (an arbitrary word).
<i>ip-access-list-number</i>	Number of the IP access list that defines remote systems.

Example

```
neighbor external-ethernet configure-neighbors
```

[no] neighbor *ip-address* next-hop-self

Configures the router to disable next-hop processing on BGP updates.

<i>ip-address</i>	IP address of the BGP-speaking neighbor.
next-hop-self	Advertise local router as next hop.

[no] neighbor *ip-address* [*priority number*] [*poll-interval number-of-seconds*]

Configures OSPF routers interconnecting to nonbroadcast networks.

<i>ip-address</i>	Neighbor's IP address.
priority number	(Optional.) Router priority value of the nonbroadcast neighbor associated with the specified IP address. The default is 0.
poll-interval number-of-seconds	(Optional.) Specifies the interval at which Hello packets are sent to a neighboring router that has become inactive. This interval should be much larger than the Hello Interval. Default is 120 seconds.

Example

```
neighbor 120.23.4.77 priority 3
```

[no] neighbor *ip-address* **remote-as** *number*

Adds a neighbor entry to the routing table for BGP.

<i>ip-address</i>	IP address of the neighbor router.
<i>number</i>	Autonomous system number of the neighbor router.

Example

```
neighbor 131.108.1.2 remote-as 109
```

[no] neighbor {*ip-address* | **any**} **third-party** *third-party-ip-address* [(**internal** | **external**)]

Sends updates regarding EGP third-party routers.

<i>ip-address</i>	IP address of the EGP peer.
<i>third-party-ip-address</i>	Address of the third-party router on the network shared by the router and the EGP peer specified by <i>address</i> .
internal	(Optional.) Indicates that the third-party router should be listed in the internal section of the EGP update.
external	(Optional.) Indicates that the third-party router should be listed in the external section of the EGP update.

Example

```
neighbor 131.108.6.5 third-party 131.108.6.99  
internal
```

[no] neighbor *ip-address* update-source *interface*

Configures the router to allow BGP sessions even when the outbound interface goes down. The **no** form of the command restores the interface assignment to the closest interface, also called the *best-local-address*.

[no] neighbor *ip-address* version *value*

Configures the router to handle only Version 2 of the BGP protocol. The **no** form returns the version to the default state for that neighbor.

<i>ip-address</i>	Address of the BGP-speaking neighbor
<i>value</i>	Version number; must be 2 or 3.

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.

<i>ip-address</i>	Specific neighbor connection to which you want to assign the <i>weight</i> .
<i>weight</i>	Weight to assign.

Example

```
neighbor 131.99.87.2 weight 50
```

[no] net *network-entity-title*

Configures a Network Entity Title (NET) for the routing process.

<i>network-entity-title</i>	Net that specifies the area address and the system ID for an IS-IS routing process. The argument can be either an address or a name.
-----------------------------	--

[no] network *ip-address*

Specifies a list of networks to be advertised as originating within an AS for BGP. For EGP, it specifies the network to be advertised to the EGP peers of an EGP routing process. 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.

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.

Example

```
network 131.108.20.0 0.0.0.255 area 10.9.50.0
network 131.108.0.0. 0.0.255.255 area 2
```

[no] network *ip-address backdoor*

Specifies to BGP that a back-door route will provide better information about the network.

ip-address Address of the network to which you want to set up a back-door route.

Example

```
network 192.31.7.0 backdoor
```

[no] offset-list {in | out} offset [access-list-number]

For IGRP, RIP, and HELLO only. Adds or removes a positive offset to incoming and outgoing metrics for networks matching an access list.

in or out	Indicate whether the offset applies to incoming (in) or outgoing (out) metrics.
<i>offset</i>	Offset. For IGRP, the offset is added to the delay component only.
<i>access-list-number</i>	(Optional.) Access list. Specify zero to apply the offset to all metrics.

Example

```
offset-list 121 out 110
```

[no] passive-interface interface

Instructs IS-IS to advertise the IP addresses for the specified interface without actually running IS-IS on that interface.

interface Interface name.

Example

```
passive-interface fddi 1
```

[no] redistribute *protocol* [*process-id*] {**level-1** | **level-1-2** | **level-2**}
[**metric** *metric-value*] [**metric-type** *type-value*] [**match internal** |
external *type-value*] [**tag** *tag-value*] [**route-map** *map-tag*] [**subnets**]

Redistributes routes from one routing domain into another routing domain.

<i>protocol</i>	Source protocol from which routes are being distributed: bgp , egp , hello , igrp , ospf , rip , or static .
<i>process-id</i>	(Optional.) Autonomous system (IGRP, BGP, or EGP) or an OSPF process ID from which routes are to be redistributed. Do not include this argument if you used the keyword rip . For isis , this is an optional <i>tag</i> that defines a name for a routing process.
level-1	For IS-IS, Level 1 routes are redistributed into other IP routing protocols independently.
level-1-2	For IS-IS, both Level 1 and Level 2 routes are redistributed into other IP routing protocols.
level-2	For IS-IS, Level 2 routes are redistributed into other IP routing protocols independently.
metric <i>metric-value</i>	(Optional.) Specifies the link state cost to be assigned to the default route. The argument <i>metric-value</i> is a dimensionless link state cost formed as a 24-bit decimal.
metric-type <i>type-value</i>	(Optional.) 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.
match internal	(Optional.) For OSPF, the criteria by which OSPF routes are redistributed into other routing domains. internal refers to routes that are internal to a specific AS.

external <i>type-value</i>	(Optional.) External route type to be redistributed into other routing domains: 1 —refers to a type-1 external route. 2 —refers to a type-2 external route.
tag <i>tag-value</i>	(Optional.) 32-bit decimal value attached to each external route.
subnets	(Optional.) Specifies the scope of redistribution for the specified protocol.

Example

```
redistribute hello metric 100 metric-type 1
```

summary-address *ip-address ip-mask* {**level-1** | **level-1-2** | **level-2**}

Creates aggregate addresses.

<i>ip-address</i>	Summary address designated for a range of addresses.
<i>ip-mask</i>	IP subnet mask used for the summary route.
level-1	Only routes redistributed into Level 1 are summarized with the configured address/mask value.
level-1-2	Injects the summary router into both a Level 1 area and a Level 2 subdomain.
level-2	Routes learned by Level 1 routing will be summarized into the Level 2 backbone with the configured address/mask value.

[no] synchronization

Enables or disables the synchronization between BGP and your IGRP. Synchronization allows a router within an AS to have the route before BGP makes it available to other ASs. It can also be used when there are routers in the AS that do not speak BGP. Disable to allow the router to advertise a network route without waiting for the IGP. The default is enabled.

[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.

<i>update</i>	Rate at which updates are sent.
<i>invalid</i>	Number of seconds after which a route is declared invalid. The value of <i>invalid</i> should be three times the value of <i>update</i> .
<i>holddown</i>	Number of seconds during which routing information regarding better paths is suppressed. The value of <i>holddown</i> should be at least three times the value of <i>update</i> .
<i>flush</i>	Number of seconds that must pass before the route is removed from the routing table. The value of <i>flush</i> should be equal to or greater than the sum of the values of <i>invalid</i> and <i>holddown</i> .
<i>sleeptime</i>	(Optional.) Number of milliseconds to postpone routing updates.

Example

```
timers basic 5 15 15 30 100
```

[no] timers bgp *keepalive holdtime*

Adjusts BGP timers. The **no** form restores the default.

<i>keepalive</i>	Frequency with which the router sends keepalive messages to its peer. Default is 60 seconds.
<i>holdtime</i>	Number of seconds that the router waits for a keepalive message before declaring a peer dead. Default is 180 seconds.

Example

```
timers bgp 50 100
```

Protocol Configuration

[no] timers egp *hello polltime*

Adjusts EGP timers. The **no** form restores the default.

hello Interval at which hello packets are sent.
Default is 60 seconds.

polltime Interval at which polling is performed. Default
is 180 seconds.

Example

```
timers egp 30 90
```

variance *multiplier*

Controls the amount of load balancing that IGRP can perform. Default is 1.

multiplier Nonzero positive integer.

Example

```
variance 5
```

IP and SLIP Show Commands

The following commands enable you to monitor your IP and SLIP configurations and connections:

Command	Display
show access-lists	Contents of IP access lists.
show arp	Displays the entries in the ARP table for the router.
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.

Command	Display
show ip accounting [checkpoint]	Active IP accounting database.
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 bgp [<i>network</i>]	Networks in the BGP routing table.
show ip bgp neighbors [<i>address</i> [<i>routes</i>]]	Information about the TCP and BGP connections to individual neighbors.
show ip bgp paths	All BGP paths in the database.
show ip bgp summary	Status of all BGP connections.
show ip cache	Routing table cache used to fast switch Internet traffic.
show ip egp	Statistics about EGP connections.
show ip interface [<i>interface unit</i>]	IP parameters configured on the interface.
show ip irdp	IRDP values.
show ip masks <i>address</i>	Masks used for network addresses and the number of subnets using each mask.
show ip ospf [<i>ospf-process-id</i>]	OSPF routing processes.
show ip ospf database	Displays lists of information related to the OSPF database for a specific router. The various forms of this command (not shown) provide information about different OSPF link state advertisements.
show ip ospf interface [<i>interface</i>]	OSPF parameters configured on the interface.
show ip ospf neighbor [<i>interface-name</i>] [<i>neighbor-id</i>] detail	OSPF neighbor information on a per-interface basis.
show ip ospf virtual-links	Displays the parameters and current state of OSPF virtual links.

Protocol Configuration

Command	Display
show ip protocols	Protocol-specific information for each active routing process in this router.
show ip redirects	Displays the address of a default gateway (router).
show ip route <i>[options]</i>	Current state of IP routing table.
show ip route summary	Displays the current state of the routing table.
show ip tcp header- compression	IP compression statistics.
show ip traffic	IP protocol statistics.
show route-map <i>[map-name]</i>	Displays all route maps configured or only the one specified.
show slip	Status of all lines configured for SLIP.
show tcp <i>[line-number]</i>	Status of TCP connections.

ISO CLNS Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] clns configuration-time *seconds*

Specifies the rate at which ESH and ISH packets are sent. The **no** form restores the default of 10.

seconds Number of seconds.

Example

```
clns configuration-time 45
```

[no] clns filter-expr *ename term*
[no] clns filter-expr *ename not term*
[no] clns filter-expr *ename term or term*
[no] clns filter-expr *ename term and term*
[no] clns filter-expr *ename term xor term*

Use one or more **clns filter-expr** global configuration commands to combine CLNS filter sets and CLNS address templates into complex logical NSAP pattern-matching expressions.

ename An alphanumeric name to apply to this expression.
term A filter expression term. A term can be any of the following:
ename—Another, previously defined, filter expression.
sname (or *destination sname*)—A previously defined filter set name, with the filter set applied to the destination NSAP address.
source sname—A previously defined filter set name, with the filter set applied to the source NSAP address.

[no] clns filter-set *sname* {[**permit**] | **deny**} *template*

Use one or more **clns filter-set** global configuration commands to build a list of CLNS address templates with associated permit and deny conditions for use in CLNS filter expressions. The **no clns filter-set** command deletes the entire filter set.

sname An alphanumeric name to apply to this filter set.
permit | **deny** A keyword to indicate that addresses matching the pattern specified by *template* are to be permitted or denied. If neither **permit** nor **deny** is specified, **permit** is assumed.
template An address template, or a template alias name, or the keyword **default**. Address templates and alias names are described under the description of the **clns template-alias** global configuration command. The **default** keyword denotes a zero-length prefix and matches any address.

[no] clns holding-time *seconds*

Allows the sender of an ESH or ISH packet to specify the length of time during which the information in the hello packets will be believed. The **no** form restores the default of 300 seconds.

seconds Number of seconds.

Example

```
clns holding-time 240
```

clns host *name nsap*

Creates a name for a Network Service Access Point (NSAP). The name can be used instead of the long set of numbers associated with an NSAP.

name Name for the NSAP.
nsap Numbers associated with the NSAP.

Example

```
clns host nsap1 47.0004.004d.3132.3334.3536.00
```

[no] clns net {*net-address* | *name*}

Assigns static network addresses. If a router is configured to support ISO CLNS and is not configured to dynamically route CLNS packets using a ISO-IGRP or IS-IS, you must use this command to assign an address to the router. The **no clns net** command removes any previously configured NET address. Default is none.

net-address Network Entity Title (NET) address.
name CLNS host name to be associated with this interface.

Example

```
clns net 47.0005.0001.0000.0001.000.00
```

[no] clns packet-lifetime *time-to-live*

Specifies the initial lifetime for locally generated packets. Default is 64.

time-to-live The packet lifetime in seconds.

Example

```
clns packet-lifetime 32
```

[no] clns route *nsap-prefix interface-type [snpa-address]*

Use this variation of the **clns route** global configuration command to create an interface-static route.

nsap-prefix The network service access point prefix. This value is entered into a static routing table and used to match the beginning of a destination NSAP. The longest matching NSAP-prefix is used.

interface-type The type of interface, such as Ethernet or Serial, plus the interface unit. Numbering begins with 0 and is incremented by 1 for each of the installed interfaces of a particular type. Use the **show interfaces EXEC** command for the interfaces installed on your router.

snpa-address An argument that is required for multiaccess networks, but optional for serial links.

[no] clns routing

Enables or disables routing of CLNS packets.

[no] clns security pass-through

Keeps the router from discarding any packets it sees with security options set.

[no] clns want-erpdu

Specifies whether the router requests error PDUs on packets sourced by the router. Default is enabled.

[no] ip domain-lookup nsap

Allows Domain Name System (DNS) queries for CLNS addresses.

ISO CLNS Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] clns access-group *name* {in | [out]}

Filters transit CLNS traffic going either into or out of the router or both on a per-interface basis.

- name* Name of the filter set or expression to apply.
- in** Filter should be applied to CLNS packets entering the router.
- out** Filter should be applied to CLNS packets leaving the router.

[no] clns adjacency-filter {es | is} *name*

Filters the establishment of CLNS end system (ES) and intermediate system (IS) adjacencies.

- es** End system adjacencies are to be filtered.
- is** Intermediate system adjacencies are to be filtered.
- name* Name of the filter set or expression to apply.

[no] clns checksum

Enables or disables checksum generation when ISO CLNS routing software sources a CLNS packet. The **no** form restores the default, which is disabled.

[no] clns cluster-alias

Configures or cancels DECnet Phase V cluster aliasing. When enabled, the router can advertise the same system identifier as other systems in end-system hello messages.

[no] clns congestion-threshold *number*

Sets the congestion experience bit if the output queue contains more than the specified number of packets. The **no** form prevents this bit from being set. Default is 4.

number Maximum number of packets that are accepted
 before the router sets the congestion experience bit.

Example

```
clns congestion-threshold 3
```

[no] clns dec-compatible

Allows ISHs sent and received to ignore the N-selector byte.

[no] clns enable

Enables static or dynamic routing. The **no** form configures the interface to pass ISO CLNS packet traffic to end systems.

[no] clns erpdu-interval *milliseconds*

Determines the minimum interval time in milliseconds between ERPDUs. The **no** form turns off the interval rate and sets no limit. Default is 10.

milliseconds Number of milliseconds between ERPDUs.

Example

```
clns erpdu-interval 5
```

[no] clns {es-neighbor | is-neighbor} *nsap snpa*

Lists all End Systems or Intermediate Systems that will be used when mapping information is statically entered. The SNPAs are the X.25 network addresses (X.121 addresses). These are usually assigned by the X.25 network provider.

es-neighbor or **is-neighbor** Specify **es-neighbor** for End Systems or **is-neighbor** for Intermediate Systems.
nsap CLNS address.
snpa MAC addresses.

Examples

```
clns is-neighbor 47.0004.0021.0001.0000.0000.00 3101
clns is-neighbor 47.0004.0021.0001.0000.0000.00
  3101 windowsize 7 7 packetsize 512 512
clns is-neighbor 47.0004.004d.3132.3334.3536.00 310117
```

[no] clns esct-time *seconds*

Supplies an ES Configuration Timer (ESCT) option in a transmitted IS Hello packet that tells the end system how often it should transmit ES Hello packet protocol data units (PDUs).

seconds Rate in seconds that ESH PDUs are transmitted.
Range is from 0 through 65535.

[no] clns mtu *size*

Sets the maximum transmission unit (MTU) packet size for the interface. The **no** form restores the default, which is the maximum packet size for the interface.

size MTU for the interface. The minimum value is 512.

Example

```
clns mtu 512
```

[no] clns net {*nsap-address* | *name*}

Assigns an NSAP address or node name for a router interface. The **no** form removes any previously configured NSAP address.

nsap-address NSAP address.

name Node name.

Example

```
clns net 47.0004.004D.0003.0000.0C00.62E6.00
```

[no] clns rdpdu-interval *milliseconds*

Determines the minimum interval time in milliseconds between RDPDUs. The **no** form sets no limit. Default is 100.

milliseconds Minimum interval time.

Example

```
clns rdpdu-interval 50
```

[no] clns route-cache

Enables or disables fast switching through the cache. Default is enabled.

[no] clns send-erpdu

Allows CLNS to send an error PDU when it detects an error in a data PDU. The **no** form disables the function. Default is enabled.

[no] clns send-rdpdu

Allows CLNS to send redirect PDUs when a better route for a given host is known. The **no** form disables the function. Default is enabled.

ISO CLNS Routing Protocols EXEC Commands

Enter the following commands from within EXEC mode.

ping clns {*host* | *address*} (user)

Sends ISO CLNS echo packets to test the reachability of a remote host over a connectionless OSI network.

clns	CLNS protocol keyword.
<i>host</i>	Host name of system to ping.
<i>address</i>	Address of system to ping.

ping clns {*host* | *address*} (privileged)

Sends ISO CLNS echo packets to test the reachability of a remote host over a connectionless OSI network.

clns	CLNS protocol keyword.
<i>host</i>	Host name of system to ping.
<i>address</i>	Address of system to ping.

trace clns *destination* (user)

Discovers the CLNS routes the router's packets will actually take when traveling to their destination.

destination Destination address or host name on the command line. The default parameters for the appropriate protocol are assumed and the tracing action begins.

trace (privileged)

Traces routes on a Cisco router configured with the ISO CLNS protocol.

which-route [*nsap-address* | *clns-name*]

Tells you which next-hop router will be used or if you have multiple processes running and want to troubleshoot your configuration. This command displays the routing table in which the specified CLNS destination is found.

nsap-address The specified CLNS destination network address.

clns-name The destination host name.

ISO CLNS Routing Protocols Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] clns route *nsap-prefix interface-type [snpa-address]*

Creates a static route for a specific interface. The **no** form with the *nsap-prefix* argument cancels the static route.

<i>nsap-prefix</i>	Prefix of NSAPs to be forwarded.
<i>interface-type</i>	Interface type and the interface unit number.
<i>snpa-address</i>	(Optional.) SNPA address to which the NSAPs are forwarded. This argument is required for multiaccess networks. It is not required for serial interface routes.

Examples

```
clns route 38.0002 serial 0
clns route 38.0003 ethernet 1 0000.0c00.1550
clns route 39.0003 serial 1 4085551212
```

[no] clns route *nsap-prefix {next-hop-net | name}*

Establishes a specific static route.

<i>nsap-prefix</i>	Prefix of NSAPs to be forwarded.
<i>next-hop-net</i>	NET where forwarded NSAPs are sent.
<i>name</i>	Name of interface where forwarded NSAPs are sent.

Examples

```
clns route 47.0004.000c 47.0005.0001.0000.0001.
0000.00
clns route 39.0001 serial 0
```

[no] clns route default *nsap-prefix interface-type*

Configures a default zero-length prefix rather than type an NSAP prefix.

<i>nsap-prefix</i>	The network service access point prefix.
<i>interface-type</i>	Interface type.

[no] clns route *nsap-prefix discard*

Tells a router to discard packets with the specified *nsap-prefix*.

<i>nsap-prefix</i>	Prefix of NSAPs to be forwarded.
--------------------	----------------------------------

Example

```
clns route 47.0004.000c discard
```

[no] clns template-alias *name template*

One or more **clns template-alias** global configuration commands builds a list of alphanumeric aliases of CLNS address templates for use in the definition of CLNS filter sets. The **no clns template-alias** command deletes the alias.

<i>name</i>	An alphanumeric name to apply as an alias for the template.
<i>template</i>	An address template, as defined below.

[no] route-map *map-tag* {**permit** | **deny**} *sequence-number*

Use this command, and its commands **match** and **set**, to define the conditions for redistributing routes from one routing protocol into another. Each **route-map** command has a list of **match** and **set** commands associated with it. See the later section “ISO CLNS Routing Protocols Route-map Configuration Commands.”

<i>map-tag</i>	Defines a meaningful name for the route map. The redistribute command uses this name to reference this route map.
permit	If the match criteria are met for this route map, and permit is specified, the route is redistributed as controlled by the set actions. If the match criteria are not met, and permit is specified, the next route map with the same map-tag is tested. If a route passes none of the match criteria, it is not redistributed by that set.
deny	If the match criteria are met for the route map, and deny is specified, the route is not redistributed, and no further route maps sharing the same map tag name will be examined.
<i>sequence-number</i>	A number that indicates the position a new route map is to have in the list of route maps already configured with the same name. If given with the no form of the command, it specifies the position of the route map that should be deleted.

[no] router isis [*tag*]

Enables the IS-IS routing protocol on your router and configures the IS-IS routing process. This command identifies the area the router will work in and lets the router know that it will be routing dynamically rather than statically. The **no router isis** command with the appropriate tag disables IS-IS routing for the system.

tag (Optional.) Defines a meaningful name for a routing process. If it is not specified, a null tag is assumed. The argument *tag* must be unique among all CLNS router processes for a given router. The *tag* argument is used later as a reference to this process.

Example

```
router isis area1
```

[no] router iso-igrp [*tag*]

Identifies the area the router will work in and lets it know that it will be routing dynamically using the ISO-IGRP protocol. The **no router iso-igrp** command with the appropriate tag disables ISO-IGRP routing for the system.

tag (Optional.) Defines a meaningful name for a routing process. If it is not specified, a null tag is assumed. The *tag* argument must be unique for a given router.

Example

```
router iso-igrp marketing
```


ISO CLNS Routing Protocols Route-map Configuration Commands

The following commands are **match** commands for the **route map** global configuration command. This command has multiple formats. The **match** commands may be given in any order, and all **match** commands must “pass” to cause the route to be redistributed according to the *set actions* given with the **set** commands.

The **set** route-map commands specify the redistribution *set actions* to be performed when all of a route map’s match criteria are met. When all match criteria are met, all set actions are performed.

[no] match clns address *name* [*name...name*]

Use this form of the **match** command for any routes with address specified by a standard access list.

clns address Any routes with the network address passed by one or more of the standard access lists specified will be redistributed.

name Name of filter set or expression.

[no] match clns next-hop *name* [*name..name*]

Use this form of the **match** command for any routes that have a next-hop router address passed by one of the access lists specified.

next-hop Any routes that have a next-hop router address passed by one of the access lists specified will be redistributed.

name Name of filter set or expression.

[no] match cns route-source *name* [*name...name*]

Use this form of the **match** command for any routes which have been advertised by routers at the address specified by the access lists.

route-source Any routes which have been advertised by routers at address specified by the access lists will be redistributed.

name Name of filter set or expression.

[no] match interface *name unit* [*name unit...name unit*]

Use this form of the **match** command for any routes that have their next hop out one of the interfaces specified.

interface Any routes that have their next hop out one of the interfaces specified will be redistributed.

name unit The names of interfaces, such as Ethernet 0 or Serial 2.

[no] match metric *metric-value*

Use this form of the **match** command for any routes with the metric specified.

metric Any routes with the metric specified will be redistributed.

metric-value A route metric. This may be an IGRP five-part metric.

[no] match route-type {level-1 | level-2}

Use this form of the **match** command for any routes that are of the specified type.

- route-type** Any routes that are of the specified type will be redistributed.
- level-1** IS-IS Level 1 routes.
- level-2** IS-IS Level 2 routes.

[no] set cns destination prefix

Use this form of the **set** command to provide a mechanism to perform conditional route aggregation as well as conditional default route advertisements.

- destination** An NSAP of a “route” to advertise instead of the one under consideration. This provides a mechanism to perform conditional route aggregation as well as conditional default route advertisements. There is no default value.
- prefix* An NSAP prefix to advertise.

[no] set level {level-1 | level-2 | level-1-2}

Use this form of the **set** command for routes that are advertised into this specified area of the routing domain.

- level** Redistributed routes are advertised into this specified area of the routing domain. For IS-IS destinations, the default value is **level-2**. For OSPF destinations, the default value is **backbone**.
- level-1** Inserted in IS-IS Level 1 LSPs.
- level-2** Inserted in IS-IS Level 2 LSPs.
- level-1-2** Inserted into both Level 1 and Level 2 IS-IS LSPs.

[no] set metric *metric-value*

Use this form of the **set** command to set the metric value to give the redistributed routes.

- metric** The metric value to give the redistributed routes. There is no default value.
- metric-value* A route metric. This can be an IGRP five-part metric.

[no] set metric-type { **internal | **external** }**

Use this form of the **set** command to set the metric type to give redistributed routes.

- metric-type** The metric type to give redistributed routes. There is no default value.
- internal** IS-IS internal metric.
- external** IS-IS external metric.

[no] set tag *tag-value*

Use this form of the **set** command to set a tag value to associate with the redistributed routes.

- tag** A tag value to associate with the redistributed route. If not specified, the default action is to forward the tag in the source routing protocol onto the new destination protocol.
- tag-value* A name for the tag.

ISO CLNS Routing Protocols Router Configuration Commands

Enter the following commands from within router configuration mode.

[no] area-password *password*

Configures the area authentication password.

password The password you assign.

[no] distance *value* [**clns**]

Configures the administrative distance for CLNS routes learned.

value Administrative distance, indicating the trustworthiness of a routing information source. This argument has a numerical value between 0 and 255. A higher relative value indicates a lower trustworthiness rating. The default is 110.

clns (Optional.) CLNS-derived routes for IS-IS.

[no] domain-password *password*

Configures the routing domain authentication password.

password The password you assign.

[no] is-type {**level-1** | **level-1-2** | **level-2-only**}

Configures the level at which the router should operate. The **no is-type** command resets routing level to the default, which is Level 1 and 2.

level-1 Causes the router to act as a station router.

level-1-2 Causes the router to act as both a station router and an area router.

level-2-only Causes the router to act as an area router only.

Example

```
is-type level-1
```

[no] metric weights *qos k1 k2 k3 k4 k5*

Specifies different metrics for the ISO-IGRP routing protocol on CLNS. This command allows you to configure the metric constants used in the ISO-IGRP composite metric calculation of reliability and load. Use the **no metric weights** command to return the five *k* constants to their default values.

<i>qos</i>	Indicates QOS, or Quality of Service. QOS defines transmission quality and availability of service. The argument must be 0, the <i>default metric</i> .
<i>k1, k2, k3, k4, k5</i>	Values that apply to ISO-IGRP for the default metric QOS. The <i>k</i> values are metric constants used in the ISO-IGRP equation that converts an IGRP metric vector into a scalar quantity. They are numbers from 0 to 127; higher numbers mean a greater multiplier effect. The default <i>k</i> values are 1, 0, 1, 0, and 0 respectively.

[no] net *network-entity-title*

Configures a Network Entity Title (NET) for the routing process. The **no net** command removes a specific NET; you must specify the NET.

<i>network-entity-title</i>	Network Entity Title, which defines the area addresses for the ISO-IGRP or IS-IS area.
-----------------------------	--

Example

```
net 47.0004.004d.0001.0000.0c11.1111.00
```

[no] redistribute *router-name* [*tag*] [**route-map** *map-tag*]

Redistributes routes from one routing domain into another routing domain.

<i>router-name</i>	The type of other routing protocol that is to be redistributed as a source of routes into the current routing protocol being configured. The keywords supported are iso-igrp and isis .
<i>tag</i>	(Optional.) Defines a meaningful name for a routing process.
route-map	(Optional.) Indicates a route map should be interrogated to filter the importation of routes from this source routing protocol to the current routing protocol. If not specified, all routes are redistributed. If this keyword is specified, but no route map tags are listed, no routes will be imported.
<i>map-tag</i>	An identifier of a configured route map.

Example

```
redistribute daffy iso-igrp area2
```

[no] redistribute static [**clns**]

Redistributes CLNS prefix static routes. This causes the router to inject any static CLNS routes into the domain.

clns (Optional.) Redistributes CLNS prefix static routes.
The default.

[no] timers basic *update-interval holddown-interval invalid-interval*

Configures ISO-IGRP timers. The **no timers basic** command restores the default values.

- | | |
|--------------------------|---|
| <i>update-interval</i> | Time, in seconds, between the sending of routing updates. The default value is 90 seconds. |
| <i>holddown-interval</i> | Time, in seconds, a system or area router is kept in holddown state, during which routing information regarding better paths is suppressed. The default value is 145 seconds. |
| <i>invalid-interval</i> | Time, in seconds, that a route remains in the routing table after it has been determined that it is not reachable. The default value is 135 seconds. |

ISO CLNS Routing Protocols Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] clns router isis [*tag*]

Enables IS-IS routing for OSI on a specified interface. The **no clns router isis** command with the appropriate area tag disables IS-IS on the interface. Use the **no router isis** command with the appropriate area tag to disable IS-IS routing for the system.

- | | |
|------------|--|
| <i>tag</i> | (Optional.) Defines a meaningful name for a routing process. If it is not specified, a null tag is assumed. It must be unique among all CLNS router processes for a given router. Use the same text for the argument <i>tag</i> as specified in the router isis global configuration command. |
|------------|--|

Example

```
clns router isis areal
```

Protocol Configuration

[no] clns router iso-igrp tag [level 2]

Specifies ISO-IGRP routing on a specified interface. The **no clns router iso-igrp** command with the appropriate area tag disables ISO-IGRP on the interface. Use the **no router iso-igrp** global configuration command with the appropriate tag to disable ISO-IGRP routing for the system.

tag Defines a meaningful name for routing process. It must be unique among all CLNS router processes for a given router. This tag should be the same as defined for the routing process in the **router iso-igrp** global configuration command.

level 2 (Optional.) Allows the interface to advertise Level 2 information.

Example

```
clns router iso-igrp area3 level2
```

[no] clns split-horizon

Implements split horizon for ISO-IGRP updates.

[no] isis adjacency-filter name [match-all]

Filters the establishment of IS-IS adjacencies.

name The name of the filter set or expression to apply.

match-all (Optional.) Specifies that all NSAP addresses must match the filter in order to accept the adjacency. If not specified, the default, only one address need match the filter in order for the adjacency to be accepted.

[no] isis circuit-type {level-1 | level-1-2 | level-2-only}

Configures the type of *adjacency* desired for this interface. The **no** form restores the default, which is **level-1-2**.

- level-1** If **level-1** is specified and there is at least one area address in common between this system and its neighbors, at most a Level 1 adjacency can be established.
- level-1-2** If **level-1-2** is specified, a Level 1 and 2 adjacency is established if the neighbor is configured as **level-1-2** and there is at least one area in common. If there is no area in common, a Level 2 adjacency is established.
- level-2-only** If **level-2-only** is specified, a Level 2 adjacency is established on the circuit. If the neighboring router is a Level 1 only router, no adjacency is established.

[no] isis csnp-interval seconds {level-1 | level-2}

Configures the IS-IS Complete Sequence Number PDUs (CSNP) interval for the specified interface.

- seconds* Interval of time between transmission of CSNPs on multiaccess networks. (Only applies for the designated router.) The default is 10 seconds.
- level-1** Configures the interval of time between transmission of CSNPs for Level 1 independently.
- level-2** Configures the interval of time between transmission of CSNPs for Level 2 independently.

[no] isis hello-interval *seconds* {**level-1** | **level-2**}

Specifies the length of time in seconds between Hello packets that the router sends on the specified interface.

seconds An unsigned integer value. The default is 10 seconds.

level-1 Configures the Hello interval for Level 1 independently. Use this on X.25, SMDS, and Frame Relay multiaccess networks.

level-2 Configures the Hello interval for Level 2 independently. Use this on X.25, SMDS, and Frame Relay multiaccess networks.

[no] isis metric *default-metric delay-metric expense-metric error-metric* {**level-1** | **level-2**}

Configures the metric (or cost) for the specified interface.

default-metric Default metric value. Default is 10.

delay-metric Not currently supported.

expense-metric Not currently supported.

error-metric Not currently supported.

level-1 or **level-2** If you do not specify **level-1** or **level-2**, the default metric applies to Level 1 and Level 2. To reset the metric for Level 1 or Level 2 only, specify the appropriate keyword.

Example

```
isis metric 8 level-1
```

[no] isis password *password* {**level-1** | **level-2**}

Configures the authentication password for an interface. The **no** form restores the default, which is disabled.

password Password you enter for authentication. It can contain up to 80 characters.

level-1 or **level-2** Indicates the level for which you want to specify the password.

Example

```
isis password yourpassword level-1
```

[no] isis priority *value* {**level-1** | **level-2**}

Sets the priority for designated router election. Priorities can be configured for Level 1 and Level 2 individually. The **no** form restores the default, which is 64.

value Priority value from 1 to 64.

level-1 or **level-2** If you do not specify **level-1** or **level-2**, the priority applies to Level 1 and Level 2. To reset the priority for Level 1 or Level 2 only, specify the appropriate keyword.

Example

```
isis priority 32
```

[no] isis retransmit-interval *seconds*

Configures the number of seconds between retransmission of IS-IS link-state PDU (LSP) retransmission for point-to-point links.

seconds An integer that should be greater than the expected round-trip delay between any two routers on the attached network. The setting of this parameter should be conservative, or needless retransmission will result. Set larger values for serial lines and virtual links. The default value is 5 seconds.

[no] iso-igrp adjacency-filter *name*

Filters the establishment of ISO-IGRP adjacencies.

name The name of the filter set or expression to apply.

ISO CLNS Show Commands

The following commands enable you to monitor your ISO CLNS configurations:

Command	Display
show clns	Information about the CLNS network.
show clns cache	CLNS routing cache.
show clns es-neighbor [<i>options</i>]	ES neighbors that this router knows about.
show clns filter-expr [<i>name</i>] [detail]	Display one or all currently defined CLNS filter expressions. When the optional keyword detail is specified, expressions are evaluated down to their most primitive filter set terms before being displayed.
show clns filter-set [<i>name</i>]	Display one or all currently defined CLNS filter sets.
show clns interface [<i>interface</i>]	CLNS parameters configured on this interface.

Command	Display
show clns is-neighbors [<i>interface-type unit</i>] [detail]	IS-IS related information for IS-IS router adjacencies.
show clns neighbors [<i>interface-type unit</i>] [detail]	Information about both ES and IS neighbors. The keyword detail displays the area addresses advertised by the neighbor in the Hello messages.
show clns protocol [domain area-tag]	Protocol-specific information about each ISO-IGRP routing process in this router.
show clns route [<i>nsap</i>]	All destinations to which this router knows how to route packets.
show clns traffic	List of CLNS packets this router has seen.
show isis database [level-1] [level-2] [l1] [l2] [detail] [<i>lspid</i>]	IS-IS link state database.
show isis routes	IS-IS Level 1 routing table.
show route-map [<i>map-name</i>]	Displays all route-maps configured or only the one specified.

Novell IPX EXEC Command

Note that all commands that in previous releases contained the keyword **novell** now use the keyword **ipx**. While you can still use the **novell** keyword in these commands, it is recommended that you use **ipx**.

ping ipx {*host* | *address*}

Checks host reachability and network connectivity.

ipx Specifies the IPX protocol.
host Host name of system to ping.
address Address of system to ping.

Novell IPX Global Configuration Commands

Enter the following IPX commands from within global configuration mode.

```
[no] access-list access-list-number {permit | deny}  
    source-network [source-node [source-node-mask]]  
    [destination-network [destination-node [destination-node-mask]]]
```

Specifies standard Novell IPX access lists.

<i>access-list-number</i>	A unique number for this access list from 800 to 899.
permit	Specifies the permit condition.
deny	Specifies the deny condition.
<i>source-network</i>	(Optional.) Source network.
<i>source-node</i>	(Optional.) Address of the source network.
<i>source-node-mask</i>	(Optional.) Mask for the <i>source-node</i> .
<i>destination-network</i>	(Optional.) Destination network.
<i>.destination-node</i>	(Optional.) Address of the destination network.
<i>destination-node-mask</i>	(Optional.) Mask for the <i>destination-node</i> .

Examples

```
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 *access-list-number* {**permit** | **deny**}
protocol [*source-network* [*source-node* [[*source-network-mask*.]
source-node-mask]] *source-socket* [*destination-network*
[*destination-node* [[*destination-network-mask*.]
destination-node-mask]] *destination-socket*]]

Specifies extended Novell IPX access lists. The **no** form removes any access list in the current image with the specified number.

<i>access-list-number</i>	Number of the access list. Decimal number from 900 through 999.
deny	Denies access if the conditions are matched.
permit	Permits access if the conditions are matched.
<i>protocol</i>	Number of an IPX protocol type, in decimal.
<i>source-network</i>	(Optional.) Number of the network from which the packet is being sent. This is an eight-digit hexadecimal number that uniquely identifies a network cable segment. It can be a number in the range 1 to FFFFFFFE. A network number of 0 matches the local network. A network number of -1 matches all networks.
<i>source-node</i>	(Optional.) Node on <i>source-network</i> from which the packet is being sent. This is a 48-bit value represented by a dotted triplet of four-digit hexadecimal numbers (<i>xxxx.xxxx.xxxx</i>).
<i>source-network-mask</i>	(Optional.) Mask to be applied to <i>source-network</i> . This is an eight-digit hexadecimal mask. Place ones in the bit positions you want to mask. If you have omitted leading zeros in the network number, you also can omit these bits in the mask. The mask must immediately be followed by a period, which must in turn immediately be followed by <i>source-node-mask</i> . The entire mask must contain no spaces; that is, you must specify it as <i>source-network-mask.source-node-mask</i> .

<i>source-node-mask</i>	(Optional.) Mask to be applied to <i>source-node</i> . This is a 48-bit value represented as a dotted triplet of four-digit hexadecimal numbers (<i>xxxx.xxxx.xxxx</i>). Place ones in the bit positions you want to mask.
<i>source-socket</i>	(Optional.) Number of the socket from which the packet is being sent, in hexadecimal.
<i>destination-network</i>	(Optional.) Number of the network to which the packet is being sent. This is an eight-digit hexadecimal number that uniquely identifies a network cable segment. It can be a number in the range 1 to FFFFFFFE. A network number of 0 matches the local network. A network number of -1 matches all networks.
<i>destination-node</i>	(Optional.) Node on <i>destination-network</i> to which the packet is being sent. This is a 48-bit value represented by a dotted triplet of four-digit hexadecimal numbers (<i>xxxx.xxxx.xxxx</i>).
<i>destination-network-mask</i>	(Optional.) Mask to be applied to <i>destination-network</i> . This is an eight-digit hexadecimal mask. Place ones in the bit positions you want to mask. If you have omitted leading zeros in the network number, you also can omit these bits in the mask. The mask must immediately be followed by a period, which must in turn immediately be followed by <i>destination-node-mask</i> . The entire mask must contain no spaces; that is, you must specify it as <i>destination-network-mask.destination-node-mask</i> .
<i>destination-node-mask</i>	(Optional.) Mask to be applied to <i>destination-node</i> . This is a 48-bit value represented as a dotted triplet of four-digit hexadecimal numbers (<i>xxxx.xxxx.xxxx</i>). Place ones in the bit positions you want to mask.
<i>destination-socket</i>	(Optional.) Number of the socket from which the packet is being sent, in hexadecimal.

Examples

```
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 *access-list-number* {**permit** | **deny**} *network*[,*node*]
[*network.node-mask*] [*service-type* [*server-name*]]

Defines an access list for filtering Service Advertisement Protocol (SAP) requests.

access-list-number SAP access list number. A unique number from 1000 through 1099.

permit Permits access if the conditions are matched.

deny Denies access if the conditions are matched.

network A hexadecimal IPX network number. The value 0 defines the local network. The value -1 defines all networks.

node (Optional.) Node on *network*.

network. (Optional.) Mask to be applied to *network* and *node*.

node-mask Place ones in the bit positions to be masked.

service-type (Optional.) Service type on which to filter. This is a hexadecimal number. A value of 0 means all services.

server-name (Optional.) Name of the server providing the specified service type. This can be any contiguous string of printable ASCII characters.

Example

```
access-list 1001 deny -1 4
access-list 1001 permit -1
```

[no] ipx gns-response-delay [*time*]

Sets the delay when responding to Get Nearest Server (GNS) requests.

time Time, in milliseconds, that the router waits after receiving a Get Nearest Server query from an IPX client before responding with a server name. Default is 500 (0.5 second). A value of zero indicates no delay.

[no] ipx gns-round-robin

Rotates using a round-robin selection method through a set of eligible servers when responding to Get Nearest Server (GNS) requests.

[no] ipx maximum-paths *paths*

Follows the **ipx 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.

Example

```
ipx maximum-paths 3
```

[no] ipx 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.

Example

```
ipx route 5e 3abc.0000.0c00.1ac9
```

[no] ipx routing [*node*]

Enables or disables IPX routing and Novell RIP routing and SAP services.

node (Optional.) System-wide host address. If you do not specify an address, the MAC address of the first Ethernet, Token Ring, or FDDI interface is used. The address must not be multicast.

Example

```
ipx routing 0000.0c00.23fe
```

[no] ipx sap *service-type name network.node socket hop-count*

Specifies or removes static Novell SAP table entries.

<i>service-type</i>	SAP service-type number.
<i>name</i>	Service name.
<i>network.node</i>	Network and host address of the server.
<i>socket</i>	Socket number for this service.
<i>hop-count</i>	Server is this number of hops away.

Example

```
ipx sap 107 MAILSERV 160.0000.0c01.2b72 8104 1
```

[no] ipx type-20-input-checks

Restricts the acceptance of IPX type 20 propagation packet broadcasts. The default is disabled.

[no] ipx type-20-output-checks

Restricts the forwarding of IPX type 20 propagation packet broadcasts. The default is disabled.

Novell IPX Interface Configuration Commands

Note that all commands that in previous releases contained the keyword **novell** now use the keyword **ipx**. While you can still use the **novell** keyword in these commands, it is recommended that you use **ipx**.

[no] ipx access-group *number*

Applies a generic output filter to an interface. The **no** form removes the number.

number Novell IPX access list number. All outgoing packets forwarded through the interface will be filtered by this access list.

Example

```
ipx access-group 815
```

[no] ipx delay *number*

Sets the tick count, which is the default increment in the delay field.

number Number of IBM clock ticks of delay to use. One clock tick is 1/18th of a second (approximately 55 milliseconds).

[no] ipx down *network*

Prevents an IPX network from running.

network Number of the network to shut down. Eight-digit hexadecimal number in the range 1 to FFFFFFFE that uniquely identifies a network cable segment. A network number of 0 matches the local network. A network number of -1 matches all networks.

[no] ipx helper-address *network.node*

Forwards broadcast packets that match the access list specified by the **ipx helper-list** interface configuration command. Useful for hosts that use a protocol other than SAP to advertise their availability.

network.node The network and host address to which broadcast packets are forwarded.

Example

```
ipx helper-address 3abc.0000.0c00.1ac9
```

[no] ipx 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 **ipx access-list** command.

Example

```
ipx helper-list 801
```

[no] ipx input-network-filter *access-list-number*

Interface configuration command 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 **ipx access-list** command.

Example

```
ipx input-network-filter 801
```

[no] ipx 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 to 1099.

Example

```
ipx input-sap-filter 1000
```

[no] ipx netbios input-access-filter {**host** | **bytes**} *name*

Controls incoming IPX NetBIOS messages.

host Indicates that the next argument is the name of a NetBIOS access filter previously defined with one or more **netbios access-list host** commands.

bytes Indicates that the next argument is the name of a NetBIOS access filter previously defined with one or more **netbios access-list bytes** commands.

name Name of a previously defined NetBIOS access list.

[no] ipx netbios output-access-filter {**host** | **bytes**} *name*

Controls outgoing NetBIOS messages.

host Indicates that the next argument is the name of a NetBIOS access filter previously defined with one or more **netbios access-list host** commands.

bytes Indicates that the next argument is the name of a NetBIOS access filter previously defined with one or more **netbios access-list bytes** commands.

name Name of a previously defined NetBIOS access list.

[no] ipx network *number* [**encapsulation** *encapsulation-type*]
[secondary]]

Enables IPX routing on a particular interface and optionally selects the type of encapsulation used on an interface when a single, physical IEEE interface supports multiple logical networks.

<i>number</i>	Network number. An eight-digit hexadecimal number in the range 1 to FFFFFFFE that uniquely identifies a network cable segment. A network number of 0 matches the local network. A network number of -1 matches all networks.
<i>encapsulation-type</i>	(Optional.) One of the following values: arpa —For Ethernet interfaces, use Novell's Ethernet_II encapsulation. Recommended for networks that handle both TCP/IP and IPX traffic. hdlc —(For serial interfaces only.) Use HDLC encapsulation. novell-ether —For Ethernet interfaces only, use Novell's Ethernet_802.3 encapsulation. sap —For Ethernet interfaces, use Novell's Ethernet_802.2 encapsulation. For Token Ring interfaces, this encapsulation consists of a standard 802.5 MAC header followed by an 802.2 LLC header For FDDI interfaces, this encapsulation consists of a standard FDDI MAC header followed by an 802.2 LLC header. snap —For Ethernet interfaces, use Novell Ethernet_SNAP encapsulation. This encapsulation consists of a standard 802.3 MAC header followed by an 802.2 SNAP LLC header. For Token Ring and FDDI interfaces, this encapsulation consists of a standard 802.5 or FDDI MAC header followed by an 802.2 SNAP LLC header.
secondary	Specifies an additional network configured after the first (primary) network.

Example

```
ipx network 5e
```

[no] ipx output-gns-filter *access-list-number*

Controls which servers are included in the Get Nearest Server (GNS) responses sent by the router.

access-list-number The SAP access list number in the range of 1000 to 1099.

[no] ipx 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 **ipx access-list** command.

Example

```
ipx output-network-filter 821
```

[no] ipx output-rip-delay *delay*

Adjusts the delay between the individual packets sent in a multiple-packet routing update.

delay Delay time, in milliseconds, between packets. The default is 0 (no delay).

[no] ipx output-sap-delay *delay*

Establishes a delay between multipacket 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.

Example

```
ipx output-sap-delay 200
```

[no] ipx 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 to 1099.

Example

```
ipx input-sap-filter 1000
```

[no] ipx pad-process-switched-packets

Controls whether odd-length packets are padded so as to be sent as even-length packets.

[no] ipx route-cache [**cbus**]

Enables or disables IPX fast switching and autonomous switching. Default is enabled.

cbus (Optional.) Enables IPX autonomous switching.

[no] ipx router-filter *access-list-number*

Specifies or removes the list of routers from which data will be accepted.

access-list-number Access list number specified in the **ipx access-list** command.

Example

```
ipx router-filter 823
```

[no] ipx 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 to 1099.
Defines the specific router from which SAP updates will be accepted or denied.

Example

```
ipx router-sap-filter 1000
```

[no] ipx 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.

Example

```
ipx sap-interval 5
```

[no] ipx sap-queue-maximum *number*

Configures the maximum length of the queue of pending SAP requests.

number Maximum length of the queue of pending SAP requests.

[no] ipx source-network-update

When enabled, repairs corrupted network numbers by setting the source network field of any packet with a hop count of zero to the local network number.

[no] ipx type-20-propagation

Forwards IPX type 20 propagation packet broadcasts to other network segments. The default is disabled.

[no] ipx update-time *interval*

Allows the Novell routing update timers to be set individually for each interface. This command can be used only in an all-Cisco 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.

interval The interval between updates. Minimum is 10.

Example

```
ipx update-time 40
```

[no] ipx watchdog-spoof

Permits the router to respond to a server's watchdog packets on behalf of a remote client.

[no] netbios access-list host *name* {deny | permit} *string*

[no] netbios access-list bytes *name* {deny | permit} *offset byte-pattern*

Each command defines an IPX NetBIOS access list filter.

host	Indicates that the following argument is the name of a NetBIOS access filter defined with one or more netbios access-list host commands.
bytes	Indicates that the following argument is the name of a NetBIOS access filter defined with one or more netbios access-list bytes commands.
<i>name</i>	Name of the access list being defined. The name can be an alphanumeric string.
deny	Denies access if the conditions are matched.
permit	Permits access if the conditions are matched.

<i>string</i>	Character string that identifies one or more NetBIOS host names. It can be up to 14 characters long.
<i>offset</i>	Decimal number that indicates the number of bytes into the packet at which the byte comparison should begin.
<i>byte-pattern</i>	Hexadecimal pattern that represents the byte pattern to match.

Novell IPX Show Commands

The following table lists Novell IPX show commands. Note that all commands that in previous releases contained the keyword **novell** now use the keyword **ipx**. While you can still use the **novell** keyword in these commands, it is recommended that you use **ipx**.

Command	Display
show ipx cache	List of fast-switching cache entries.
show ipx interface [<i>interface unit</i>]	IPX parameters configured on the interface.
show ipx route [<i>network</i>]	IPX routing table.
show ipx servers [options]	Servers discovered through SAP advertisements.
show ipx traffic	Information about IPX packets transmitted and received including number and type.

XNS EXEC Command

Enter the following command from within EXEC mode.

ping xns {*host* | *address*}

Sends ICMP *Echo* messages to check host reachability and network connectivity. If the router receives an ICMP *Echo* message, it sends an ICMP *Echo Reply* message to the source of the ICMP *Echo* message.

XNS Global Configuration Commands

Enter the following commands from within global configuration mode.

```
[no] access-list access-list-number {permit | deny} source-network  
[source-address [source-address-mask]] [destination-network  
[destination-address [destination-address-mask]]]
```

Configures or removes a standard XNS access list.

<i>access-list-number</i>	Access list number in the range from 400 to 499.
permit or deny	Specifies the filtering action.
<i>source-network</i>	The XNS source network.
<i>source-address</i>	(Optional.) Address of the <i>source-network</i> .
<i>source-address-mask</i>	(Optional.) Mask for the <i>source-address</i> .
<i>destination-network</i>	(Optional.) The XNS destination network.
<i>destination-address</i>	(Optional.) Address of the <i>destination-network</i> .
<i>destination-address-mask</i>	(Optional.) Mask for the <i>destination-address</i> .

Examples

```
access-list 400 deny -1 2  
access-list 400 deny 21.0000.0c00.1111  
access-list 400 deny 21.011.1622.0015 0000.0000.0000  
31.01D3.020C.0022 0000.0000.0000
```

[no] access-list *access-list-number* { **deny** | **permit** } *protocol*
[*source-network* [*source-address* [*source-address-mask*]]
source-socket [*destination-network* [*destination-address*
[*destination-address-mask*]] *destination-socket*]]

Configures or removes an extended XNS access list.

<i>access-list-number</i>	Access list number from 500 to 599.
permit or deny	Specifies the filtering action.
<i>protocol</i>	XNS protocol number.
<i>source-network</i>	(Optional.) The source network.
<i>source-address</i>	(Optional.) Address of the <i>source-network</i> .
<i>source-address-mask</i>	(Optional.) Mask for the <i>source-address</i> .
<i>destination-network</i>	(Optional.) The destination network.
<i>destination-address</i>	(Optional.) Address of the <i>destination-address</i> .
<i>destination-address-mask</i>	(Optional.) Mask for the <i>destination-address</i> .
<i>destination-socket</i>	(Optional.) Number of the socket from which the packet is being sent, in hexadecimal form.

Examples

```
access-list 500 deny 1 1 1234 2 1234
access-list 500 deny 1 21.110011.1622.001500.0000.
0000 31.01D3.020C.0022 0000.0000.0000. 1234
```

no access-list *access-list-number*

Removes the specified XNS access list.

<i>access-list-number</i>	Access list number.
---------------------------	---------------------

Example

```
no access-list 401
```

[no] xns forward-protocol *protocol*

Defines the protocol types that will be forwarded when a broadcast is received on an interface that has an XNS helper address. The **no** form disables forwarding of the specified protocol.

protocol A decimal number corresponding to an appropriate XNS protocol.

Example

```
xns forward-protocol 2
```

[no] xns maximum-paths *number*

Sets the maximum number of equal-cost paths the router will use. Default is 1.

number Maximum number of paths.

Example

```
xns maximum-paths 2
```

[no] xns route *network network.host*

Adds a static route to the XNS routing table.

network The destination XNS network number expressed in decimal format.

network.host A decimal XNS network number and the hexadecimal host number.

Example

```
xns route 25 51.0456.acd3.1243
```

Protocol Configuration

[no] xns routing [*address*]

Enables XNS routing. The **no** form disables all XNS packet processing.

address (Optional.) XNS address the router should use. If the argument *address* is omitted, the router uses the first Token Ring, FDDI, or Ethernet interface hardware address it finds.

Example

```
xns routing 0123.4567.abcd
```

[no] xns ub-emulation

Enables Ungermann-Bass Net/One routing. Causes hello packets and routing updates in Ungermann-Bass format to be sent out through all the interfaces on which XNS is enabled. Also causes the router to get its routing information for remote networks from Ungermann-Bass updates. The **no** form restores the router to standard XNS mode.

[no] xns ub-routing

Makes the router behave exactly as it would if you issued the **xns ub-emulation** command for the system as a whole, as well as the **xns hear-rip**, **xns flood broadcast allnets**, and **xns flood specific allnets** commands for all interfaces on which XNS is enabled.

XNS Interface Configuration Commands

Enter the following commands from within interface configuration mode.

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

Assigns an XNS access list number to an interface. Also compares all XNS packets that ordinarily would have been forwarded by the router through this interface to the access list. If the packet fails the access list, it is discarded and not transmitted.

access-list-number Access list number.

Example

```
xns access-group 500
```

[no] xns encapsulation {**snap** | **ub** | **3com**}

Selects encapsulation for a Token Ring interface. Default is **snap**.

snap Token Ring in an IBM installation.
ub Ungermann-Bass.
3com Older 3Com Corporation products.

Example

```
xns encapsulation ub
```

[no] xns flood broadcast allnets

Floods packets with destinations of -1.FFFF.FFFF.FFFF.

[no] xns flood broadcast net-zero

Floods packets with destinations of 0.FFFF.FFFF.FFFF.

[no] xns flood specific allnets

Floods packets with destinations of -1.

[no] xns hear-rip *[access-list-number]*

Configures the router to receive RIP updates on some interfaces as if they were Ungermann-Bass updates.

access-list-number (Optional.) XNS access list. Include this argument when you only want certain routes to be learned through standard RIP.

[no] xns helper-address *network.host*

Sets a helper address to forward broadcasts. The **no** form disables XNS helping.

network.host Combination of the network and host addresses in dotted decimal format.

Example

```
xns helper-address -1.FFFF.FFFF.FFFF
```

[no] xns input-network-filter *access-list-number*

Defines the networks that are added to your router's routing table.

access-list-number Access list number specified in the XNS **access-list** command.

Example

```
xns input-network-filter 429
```

[no] xns network *number*

Assigns a decimal XNS network number to an interface, thereby enabling that interface to run XNS protocols.

number Network number in decimal format.

Example

```
xns network 20
```

[no] xns output-network-filter *access-list-number*

Defines the list of networks your router sends out in routing updates.

*access-list-
number* Access list number.

Example

```
xns output-network-filter 439
```

[no] xns route-cache

Enables or disables fast switching.

[no] xns router-filter *access-list-number*

Controls the list of routers from which data will be accepted.

*access-list-
number* Access list number specified in the XNS **access-
list** command.

Example

```
xns router-filter 466
```

[no] xns update-time *interval*

Sets the XNS routing update timers. Use this command only in an all-Cisco environment. Make sure that all timers are the same for routers attached to the same network segment. Default is 30 seconds.

interval Frequency with which RIP sends routing table updates to its neighbor routers. Must be greater than or equal to 10 seconds.

Example

```
xns update-time 20
```

XNS Show Commands

The following commands permit you to monitor your XNS configurations.

Command	Display
show xns cache	List of fast-switching cache.
show xns interface [<i>interface</i>] <i>unit</i>	XNS parameters configured on the interface.
show xns route [<i>network</i>]	XNS routing table.
show xns traffic	Packet statistics including packets sent, received, and forwarded.

Bridging Configuration

This section lists transparent bridging commands.

Transparent Bridging Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] access-list *access-list-number* {**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.

<i>access-list-number</i>	An integer from 700 to 799 selected for the list.
permit or deny	Indicates whether the frame is permitted or denied.
<i>address</i>	48-bit canonical MAC address written in dotted triplet form.
<i>mask</i>	48-bit canonical MAC address written in dotted triplet form. The ones bits in the <i>mask</i> argument are the <i>address</i> bits to be ignored.

Examples

```
access-list 700 deny 0800.2000.0000 0000.00FF.  
FFFF  
access-list 700 permit 0000.0000.0000 FFFF.FFFF.  
FFFF
```

[no] access-list *access-list-number* {**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.

<i>access-list-number</i>	Unique number from 200 to 299 that identifies the list.
permit or deny	Indicates whether the frame is permitted or denied.
<i>type-code</i>	16-bit hexadecimal number with a leading "0x."
<i>wild-mask</i>	16-bit hexadecimal number whose ones bits correspond to bits in the <i>type-code</i> argument that the router should ignore when making a comparison.

Examples

```
access-list 201 permit 0x6005 0x0000
access-list 201 deny 0x0000 0xFFFF
```

[no] access-list *access-list-number* {**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.

<i>access-list-number</i>	An integer from 1100 through 1199.
permit or deny	Indicates whether the frame is permitted or denied.
<i>source-addr</i>	MAC Ethernet address in the form xxxx.xxxx.xxxx.
<i>source-mask</i>	Mask of MAC Ethernet source address bits to be ignored.
<i>dest</i>	MAC Ethernet values used for matching the destination address of a packet.

<i>dest-mask</i>	Mask of MAC Ethernet destination address bits to be ignored.
<i>offset-into-packet</i>	With the <i>size</i> argument, defines a range of values that must be satisfied in the access list. Specified in decimal or hexadecimal format in the form <i>0xnn</i> .
<i>size</i>	An integer from 1 to 4.

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

The argument *operand* is a value to be compared to or masked against.

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.

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.

<i>group</i>	Spanning tree group number.
<i>mac-address</i>	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	(Optional.) Enables the bridge to forward a frame sent from or destined for the specified address.
discard	(Optional.) Instructs the bridge to discard frames sent from or destined for the specified address without further processing.
<i>interface</i>	(Optional.) Specifies an interface on which the address can be reached.

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. Non-Cisco bridges might not work correctly on networks containing Cisco bridges' domain numbers other than zero.

<i>group</i>	Bridge group number between 0 and 10 as specified by the bridge group protocol ieee command.
<i>domain-number</i>	Unique domain number that you choose. The domain number zero is required for communicating with IEEE bridges that do not support this domain extension. Default is zero.

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.

<i>group</i>	Spanning tree group number.
<i>seconds</i>	The forward delay interval from 10 to 200 seconds.

Example

```
bridge 1 forward-time 60
```

bridge group hello-time seconds

Specifies the interval between Bridge Protocol Data Units (BPDUs). Default is 2 seconds.

group Spanning tree group number.
second Time interval, from 1 to 10 seconds.

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 20 seconds. The range is from 10 to 200 seconds.

group Spanning tree group number.
second Interval that the bridge will wait to hear BPDUs from the root bridge.

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.

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. The minimum = 1 and the maximum = 65000 for both IEEE and for DEC. The default for IEEE is 32768. The default for DEC = 128.

group Spanning tree group number.
number Priority number from 1 to 65000.

Example

```
bridge 2 priority 1000
```

[no] bridge *group* protocol {dec | ieee}

Defines or removes a spanning tree protocol and spanning tree group.

group Spanning tree group number from 1 to 9.
ieee or **dec** The protocol to use.

Example

```
bridge 9 protocol dec
```

Transparent Bridging Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[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.

Example

```
bridge-group 2
```

[no] bridge-group *group* [**cbus-bridging**]

Assigns each network interface to a spanning-tree group.

group Spanning tree group number.
cbus-bridging (Optional.) Enables bridge flooding on the CSC-CCTL2 bus controller microcode and provides support for the CSC-C2/MEC and CSC-C2/FCIT interface cards. Default is disabled.

bridge-group *group* **circuit** *number*

Establishes load balancing, marking a serial interface as belonging to circuit group number. Parallel serial interfaces on both bridges must all 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 to 15.

Example

```
bridge-group 3 circuit 1
```

[no] bridge-group *group* **input-address-list** *access-list-number*

Assigns or removes an access list to or from a particular interface for filtering by type codes.

<i>group</i>	Spanning tree group number.
<i>access-list-number</i>	Access list number between 700 and 799 assigned with the bridge-group command.

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.

<i>group</i>	Spanning tree group number.
<i>grouplist</i>	Specifies the LAT groups. Single numbers and ranges are permitted.

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.

<i>group</i>	Spanning tree group number.
<i>grouplist</i>	Specifies the LAT groups. Single numbers and ranges are permitted.

Example

```
bridge-group 1 input-lat-service-permit 1 5 12-14
```

bridge-group *group* **input-lsap-list** *access-list-number*

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.

<i>group</i>	Spanning tree group number.
<i>access-list-number</i>	Access list number between 200 and 299 assigned with the bridge access-list command.

Example

```
bridge-group 2 input-lsap-list 250
```

bridge-group *group* **input-type-list** *access-list-number*

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.

<i>group</i>	Spanning tree group number.
<i>access-list-number</i>	Access list number between 200 and 299 assigned with the bridge-group command.

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.

<i>group</i>	Spanning tree group number.
--------------	-----------------------------

Example

```
bridge-group 2 lat-compression
```

[no] bridge-group *group* **output-address-list** *access-list-number*

Assigns or removes an access list to or from a particular interface for filtering by the MAC destination addresses.

<i>group</i>	Spanning tree group number.
<i>access-list-number</i>	Access list number between 200 and 299 assigned with the bridge-group command.

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.

<i>group</i>	Spanning tree group number.
<i>grouplist</i>	Specifies the LAT groups. Single numbers and ranges are permitted.

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.

<i>group</i>	Spanning tree group number.
<i>grouplist</i>	Specifies the LAT groups. Single numbers and ranges are permitted.

Example

```
bridge-group 1 output-lat-service-permit 1 5 12-14
```

bridge-group *group* **output-lsap-list** *access-list-number*

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.

<i>group</i>	Spanning tree group number.
<i>access-list-number</i>	Access list number between 200 and 299 assigned with the bridge-group command.

Example

```
bridge-group 3 output-lsap-list 223
```

bridge-group *group* **output-type-list** *access-list-number*

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.

<i>group</i>	Spanning tree group number.
<i>access-list-number</i>	Access list number between 200 and 299 assigned with the bridge-group command.

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 for DECnet on Ethernet.

<i>group</i>	Spanning tree group number.
<i>cost</i>	Integer from 1 to 65535. Higher values indicate higher costs.

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.

<i>group</i>	Spanning tree group number.
<i>number</i>	Priority value expressed as an integer from 0 to 255. The lower the number, the more likely it is that the bridge on this interface will be chosen as the root.

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

The following commands permit you to monitor your transparent bridging configuration.

Command	Display
show bridge [<i>options</i>]	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 and if the interface is configured for a bridge circuit group and/or autonomous bridging.

Bridging Configuration

IBM Connectivity

This section includes the following types of commands:

- LLC2 interface and show
- SDLC interface configuration
- Source-route bridging global, interface, and show
- SDLLC interface configuration
- STUN global, interface, and show

LLC2 Interface Configuration Commands

Enter the following commands from within interface configuration mode.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Example

```
llc2 xid-retry-time 10000
```

LLC2 Show Command

The following command enables you to monitor your LLC2 configuration.

Command	Display
show llc2	State of the LLC2 connections.

SDLC Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] sdlc address *hexbyte*

Assigns the set of secondary stations attached to the serial link.

hexbyte The hexadecimal address of the secondary station.

Example

```
sdlc address c1
```

[no] sdlc fair-poll-timer *milliseconds*

Specifies how long the router can continue to send output before it begins polling the secondary station for input. The **no** form restores the default, which is 500 milliseconds. Minimum = 100, maximum = 10000.

milliseconds Number of milliseconds the router has for uninterrupted sending of output.

Example

```
sdlc fair-poll 750
```

[no] sdlc frmr-disable

Indicates whether the secondary devices off this link support Frame Rejects (FRMRs). The **no** version restores the default, which is enabled.

sdlc holdq *sdlc-address queue-size*

Controls the maximum number of outstanding packets that can be held for transmission to a remote SDLC device. Minimum = 1, maximum = none, default = 12.

sdlc-address The SDLC address for which you want to specify a queue size.

queue-size The maximum number of outstanding packets held for transmission.

Example

```
sdlc holdq c1 30
```


sdlc k *window-size*

Controls the router's local send window size. Minimum = 1, maximum = 7, default = 7.

window-size The maximum number of I-frames the router receives before the other end must stop sending and wait for an acknowledgment.

Example

```
sdlc k 7
```

sdlc n1 *bit-count*

Controls the maximum number of bits allowed for incoming frames on this link. Minimum = 1, maximum = 12000, default = 12000.

bit-count Maximum bit size. Frames that exceed this size are rejected.

Example

```
sdlc n1 3000
```

sdlc n2 *retry-count*

Controls the number of times the router attempts to retry an operation that has timed out. Minimum = 1, maximum = 255, default = 20.

retry-count Number of retry attempts. When this number is exceeded, the SDLC station terminates its session with the other station.

Example

```
sdlc n2 5
```

[no] sdlc poll-limit-value *count*

Controls how many times the router can poll a particular secondary station before it must poll the next station in the poll list. The **no** form restores the default, which is 1. Minimum = 1, maximum = 10.

count Maximum number of times the router can poll one station before proceeding to the next.

Example

```
sdlc poll-limit-value 3
```

[no] sdlc poll-pause-timer *milliseconds*

Controls how long the router pauses between sending each series of poll frames. The **no** form restores the default, which is 100 milliseconds. Minimum = 100, maximum = 10000.

milliseconds Number of milliseconds that the router waits before sending.

Example

```
sdlc poll-pause timer 150
```

sdlc t1 *timeout*

Controls the amount of time that the router waits for a reply to a frame or sequence of frames. Minimum = 1, maximum = 64000, default = 3000.

timeout The time in milliseconds that the router waits.

Example

```
sdlc t1 6000
```

Source-Route Bridging Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] access-list *access-list-number* {**permit** | **deny**} *type-code* *wild-mask*

Configures the access list mechanism for filtering frames by protocol type.

<i>access-list-number</i>	Access list number.
permit or deny	Specify permit to permit the frame; specify deny to deny the frame.
<i>type-code</i>	LSAP-type code for 802-encapsulated packets or SNAP-type code for SNAP-encapsulated packets. 16-bit hexadecimal number.
<i>wild-mask</i>	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.

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).

<i>list</i>	An arbitrary integer between 1 and 10 that identifies the LU address priority list selected by the user.
<i>address-number</i>	Value of the LOCADDR= parameter on the LU macro; this is a 1-byte address of the LU in hex.
<i>queue-keyword</i>	A priority queue name; one of high , medium , normal , or low .

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.

<i>name</i>	Name of the access list being defined.
permit or deny	Specifies the permit or deny condition.
<i>offset</i>	Decimal number indicating the number of bytes into the packet where the byte comparison should begin. An offset of zero points to the beginning of the NetBIOS delimiter string (0xffef) at the start of each NetBIOS packet.
<i>pattern</i>	Hexadecimal string of digits representing a byte pattern.

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.

<i>name</i>	Name of the access list being defined.
permit or deny	Specifies the permit or deny condition.
<i>pattern</i>	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.

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

Defines a static NetBIOS name cache entry. The **no** form removes the entry.

<i>mac-address</i>	MAC address.
<i>NetBIOS-name</i>	Server name linked to the MAC address.
<i>interface-name</i>	Specifies that the link is accessible locally.
ring-group <i>number</i>	Specifies that the link is accessible remotely.

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.

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.

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.

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.

<i>mac-address</i>	12-digit hexadecimal string written as a dotted triplet.
<i>rif-string</i>	(Optional.) Series of four-digit hexadecimal numbers, each series separated by a dot (.).
<i>interface-name</i>	(Optional.) The interface from which this RIF entry would have arrived.
ring-group <i>ring</i>	(Optional.) The ring group number from which this RIF entry would have arrived.

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.

Example

```
rif timeout 20
```

[no] **source-bridge enable-80d5**

Enables or disables the conversion of frames between Token Ring LLC2 and Ethernet Type II 0x80d5 format. When disabled, Token Ring LLC2 frames are converted to IEEE 802.3 format LLC2 frames. This command applies only to frames going through the source-route translational bridge (SR/TLB) and not to frames going across a source-route transparent (SRT) bridge.

[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.

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.

Example

```
source-bridge 5 2052
```

[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.

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*] [If** *size*] [**version** *number*]**

Defines or removes a serial interface over which to run bridged Token Ring traffic.

<i>ring-group</i>	Ring group number.
<i>interface-name</i>	(Optional.) Name of the serial interface.
<i>mac-address</i>	(Optional.) MAC address; required for nonserial interfaces.
If <i>size</i>	(Optional.) Largest frame size to send to the remote peer.
version <i>number</i>	(Optional.) Specifies the forced RSRB protocol version number for the remote peer.

Example

```
source-bridge remote-peer 5 interface serial0
```

[no] source-bridge remote-peer *ring-group* tcp *ip-address* [If** *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* [If** *size*] [**version** *number*]**

Defines or removes a remote peer for the specified ring group.

<i>ring-group</i>	Ring group number.
<i>ip-address</i>	IP address.
If <i>size</i>	(Optional.) Largest frame size to send to the remote peer.

<i>local-ack</i>	(Optional.) Specifies that Local Acknowledgment should be used for LLC2 session going to this remote peer.
version number	(Optional.) Specifies the forced RSRB protocol version number for the remote peer.
backup-group group-number	(Optional.) Backup group number.
fst	Specifies the Fast Sequenced Transport (FST).

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.

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).

Example

```
source-bridge sap-80d5 1c
```

[no] source-bridge sdllc-local-ack

Activates/deactivates Local Acknowledgment for SDLLC sessions.

[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.

Example

```
source-bridge tcp-queue-max 125
```

[no] source-bridge transparent *ring-group pseudo-ring bridge-number tb-group* [*oui*] [**enable-name-cache**]

Establishes a source-route translational bridging (SR/TLB) link between the source-bridged *ring-group* and the transparent bridge group *tb-group*.

<i>ring-group</i>	Virtual ring group created by the source-bridge ring-group command.
<i>pseudo-ring</i>	Unique ring number used to represent the transparent bridging domain to the source-route bridging domain.
<i>bridge-number</i>	Pseudo-bridge that attaches the <i>ring-group</i> to the <i>pseudo-ring</i> .
<i>tb-group</i>	Number of the transparent bridge group that you want to tie into your source-route bridging domain.
<i>oui</i>	(Optional.) Organizational unique identifier. Possible values include: 90-compatible ; standard ; cisco .
enable-name-cache	Enables the NetBIOS name cache.

Example

```
source-bridge transparent 10 3 1 1
```

Source-Route Bridging Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[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.
<i>expression</i>	A Boolean access list expression containing one or more of the following: <ul style="list-style-type: none"><i>lsap(nnn)</i>—LSAP access list <i>nnn</i> to be evaluated for this frame.<i>type(nnn)</i>—SNAP type access list to be evaluated for this frame.<i>smac(nnn)</i>—Access list to match the source MAC address of the frame.<i>dmac(nnn)</i>—Access list to match the destination MAC address of the frame.<i>netbios-host(name)</i>—NetBIOS-host access list to be applied on NetBIOS frames traversing the interface.<i>netbios-bytes(name)</i>—NetBIOS-bytes access list to be applied on NetBIOS frames traversing the interface.

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 zero.

number Integer between 0 and 3.

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 LNM's. Default is 10 (0.1%).

number Number of frames dropped compared with number of frames forwarded, expressed as hundredths of a percent. Range: 0 to 9999.

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 6 to 8 characters that can be any combination of letters and numbers and the characters @, #, \$, and %.

Example

```
lnm password 4 yourpassword
```

[no] lnm rem

Enables or disables 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 or disables 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 (2 seconds).

number Number of tens of milliseconds between error messages.

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.

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.

Example

```
mac-address 79c1.39de.0003
```

[no] multiring {*protocol-keyword* | **all** | **other**}

Enables or disables 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: **apollo**, **appletalk**, **clns**, **decnet**, **ip**, **novell**, **vines**, or **xns**. To enable the multiring for all frames, use **all**. To enable the multiring for a frame not included in the list, use **other**.

Example

```
multiring clns
```

[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 or removes an access list filter on incoming messages.

name Name of a NetBIOS access filter.

Example

```
netbios input-access-filter bytes marketing
```

[no] netbios input-access-filter host *name*

Defines or removes an access list filter on incoming messages.

name Name of a NetBIOS access filter.

Example

```
netbios input-access-filter host marketing
```

[no] netbios output-access-filter bytes *name*

Defines or removes an access list filter on outgoing messages.

name Name of a NetBIOS access filter.

Example

```
netbios output-access-filter bytes marketing
```


[no] netbios output-access-filter host *name*

Defines or removes an access list filter on outgoing messages.

name Name of a NetBIOS access filter.

Example

```
netbios output-access-filter host marketing
```

[no] source-bridge local-ring bridge-number target-ring

Enables or disables source bridging on a specific interface.

local-ring Ring number from 1 to 4095 for this interface's Token Ring.

bridge-number Decimal number from 1 to 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.

Example

```
source-bridge 129 1 130
```

[no] source-bridge input-address-list access-list-number

Interface configuration command 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.

access-list-number Number of the access list.

Example

```
source-bridge input-address-list 201
```

source-bridge input-lsap-list *access-list-number*

Interface configuration command 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 zero to disable the filter.

access-list-number Number of the access list.

Example

```
source-bridge input-lsap-list 201
```

source-bridge input-type-list *list*

Interface configuration command 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 zero to disable the filter.

access-list-number Number of the access list.

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.

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 *access-list-number*

Assigns or removes an access list to or from a particular interface for filtering the Token Ring or IEEE 802 destination addresses.

access-list-number Number of the access list.

Example

```
source-bridge output-address-list 201
```

source-bridge output-lsap-list *access-list-number*

Filters IEEE 802-encapsulated packets on output. This access list is then applied just before sending out a frame to an interface. Specify zero to disable the filter.

access-list-number Number of the access list.

Example

```
source-bridge output-lsap-list 201
```

source-bridge output-type-list *access-list-number*

Filters SNAP-encapsulated packets on output. This access list is then applied just before sending out a frame to an interface. Specify zero to disable the filter.

access-list-number Number of the access list.

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 [cbus]

Enables fast switching to allow for faster implementations of local source-route bridging between the 4- or 16-megabit Token Ring card or between two high-speed ciscoBus Token Ring cards in the same router. 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

The following commands enable you to monitor your source-route bridging configurations.

Command	Display
show llc2	State of the LLC2 connections.
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 <i>[interface]</i>	LNM parameters configured on the interface.
show lnm ring <i>number</i>	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.

Command	Display
show rif	Contents of the RIF cache.
show source-bridge	Current source bridge configuration and statistics.

SDLLC Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] sdllc partner *mac-address sdlc-address*

Supports device-initiated connections for SDLLC.

mac-address Token Ring MAC address.
sdlc-address SDLC serial line address.

[no] sdllc ring-largest-frame *value*

Indicates the largest I-frame size that can be sent or received by the LLC2 side of the SDLLC connection. The default value is 516 bytes.

value Same as those for the *largest-frame* parameter of the **source-bridge remote-peer** command.

[no] sdllc sdlc-largest-frame *address value*

Indicates the largest I-frame size that can be sent or received by the SDLC station.

address Station address.
value Frame size in bytes; the default is 265 bytes.

[no] sdllc traddr *xxxx.xxxx.xx00 lr bn tr*

Enables the use of SDLLC on a serial interface.

<i>xxxx.xxxx.xx00</i>	MAC address to be assigned to the serial interface.
<i>lr</i>	The SDLLC virtual ring number.
<i>bn</i>	The SDLLC bridge number.
<i>tr</i>	The SDLLC target ring number.

Example

```
sdllc traddr 0220.3333.4400 9 1 100
```

[no] sdllc xid *address xxxxxxxx*

Specifies an XID value to be associated with the SDLC station.

<i>address xxxxxxxx</i>	Station address. This value is used to reply to XIDs received on the Token Ring (LLC2) side of the connection. The default is not to support XIDs. The XID must be 4 bytes (eight digits) in length and is specified with hexadecimal digits.
-------------------------	---

STUN Global Configuration Commands

Enter the following commands from within global configuration mode.

[no] stun peer-name *ip-address*

Enables or disables STUN.

<i>ip-address</i>	IP address by which this STUN peer is known to other STUN peers that are using the TCP transport.
-------------------	---

Example

```
stun peer-name 131.108.254.6
```

[no] stun poll-interval *milliseconds*

Changes the interval between each sequence of proxy polls generated on the secondary side of the connection. The **no** form restores the default, which is 20 milliseconds or 1/50th of a second.

milliseconds Number of milliseconds in the interval. The minimum value is 20.

Example

```
stun poll-interval 100
```

[no] stun primary-pass-through *seconds*

Changes the interval between each pass-through of polls exchanged by the primary and secondary SDLC devices. The **no** form restores the default of 20 seconds.

seconds Number of seconds in the interval.

Example

```
stun primary-pass-through 20
```

[no] stun protocol-group *group-number* [*protocol*] [**sdlc-tg**]

Associates or removes group numbers with protocol names. With SDLC tag, accommodates a multilink SDLC Transmission Groups (TG) across STUN connections between IBM communications controllers.

group-number (Optional.) Number from 1 to 255.
protocol (Optional.) A predefined protocol (**basic** or **sdlc**) or a protocol that you define.
sdlc-tg (Optional.) Identifies the group as part of a Transmission Group.

Example

```
stun protocol-group 3 sdlc-tg
```

[no] stun schema *name* **offset** *constant-offset* **length** *address-length*
format *format-keyword*

Specifies a format, or schema, for a user-defined protocol. The **no** form removes the schema.

name Name of the protocol.
constant-offset Constant offset in bytes for the address to be found in the frame.
address-length Length of that offset.
format-keyword Format to be used to specify and display addresses for routes on interfaces that use this STUN protocol. The allowable formats and their maximum lengths are listed in the following table.

Formats	Base	Length
Decimal	Base 10 addresses (0–9)	4
Hexadecimal	Base 16 addresses (0–F)	8
Octal	Base 8 addresses (0–7)	4

Example

```
stun schema new-sdlc offset 0 length 1 format octal
```

STUN Interface Configuration Commands

Enter the following commands from within interface configuration mode.

[no] stun group *group-number*

Places a STUN-enabled interface in a defined group.

group-number Any number from 1 to 255.

Example

```
stun group 20
```

[no] stun proxy-poll address *address modulus modulus*
{ **primary** | **secondary** }

[no] stun proxy-poll address *address discovery*

Enables or disables proxy polling. Default is disabled.

<i>address</i>	Address of the device on which to enable proxy polling.
modulus	Modulus of the link as defined by the MODULUS parameter specified in the line descriptions on the SDLC host.
primary or secondary	Indicates whether the SDLC device is primary or secondary.
discovery	Use this keyword if you do not specify primary and secondary ends and connections are negotiated.

Examples

```
stun proxy-poll address C1 modulus 8 secondary  
stun proxy-poll address C1 discovery
```

[no] stun route all tcp *ip-address*
[no] stun route all interface serial *interface-number*
[no] stun route all interface serial *interface-number* **direct**
[no] stun route address *address-number* **tcp** *ip-address* **[local-ack]**
[priority]
[no] stun route address *address-number* **interface serial**
interface-number
[no] stun route address *address-number* **interface serial**
interface-number **direct**

Enables or disables forwarding of frames on the interface.

all	Specifies that all STUN traffic received on the input interface will be propagated regardless of the address contained in the SDLC frame.
tcp	Causes the TCP transport mechanism to be used to propagate frames that match the entry.
<i>ip-address</i>	Address that identifies the remote STUN peer that is connected to the far SDLC link.
interface serial	Indicates that the serial transport method of the STUN function will be used to propagate the SDLC frame.
<i>interface-number</i>	Serial line number connected to the router.
direct	Indicates that the specified interface is a direct STUN link, not a serial connection to another peer.
address	Specifies how an SDLC frame that contains a particular address is to be propagated.
<i>address-number</i>	Address in the SDLC frame expressed as an octal, decimal, or hexadecimal address in the range allowed by the protocol.
local-ack	(Optional.) Sets up SDLC Local Acknowledgment for a serial tunnel.
priority	(Optional.) Enables priority queuing.

Examples

```
stun route address 7 interface serial 1
stun route address 10 tcp 131.108.8.1
stun route all tcp 131.108.10.1
stun route address C1 tcp 131.108.1.1
```

STUN Show Commands

The following commands enable you to monitor your STUN configurations.

Command	Description
show stun	Current status of STUN.
show stun sdic	Proxy state of interfaces on an address-by-address basis.