DECbrouter 90 Products

Command Summary

Order Number: EK–DECBR-CS. A01

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About This Guide

Introduction

This booklet provides a summary of the commands a system administrator uses to configure a DECbrouter 90 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 *DECbrouter 90 Products Configuration and Reference, Volume 1*, *DECbrouter 90 Products Configuration and Reference, Volume 2*, and *DECbrouter 90 Products Configuration and Reference, Volume 3* for more complete descriptions and examples of the commands.

Organization

The following chapters are contained in this guide:

- **Chapter 1, System Use Commands**–lists the system use commands.

- **Chapter 2, System Management Commands**–lists the system management commands.

- **Chapter 3, System Configuration Commands**–lists the system configuration commands.

- **Chapter 4, Interface and Media Configuration**–lists the interface and media configuration commands.

- **Chapter 5, Protocol Configuration**–lists the protocol configuration commands.

- **Chapter 6, ISO CLNS Routing Protocols**–lists the ISO CLNS routing protocols.

- **Chapter 7, Bridging Configuration**–lists the bridging configuration commands.

- **Chapter 8, IBM Connectivity**–lists the IBM connectivity commands.

Conventions

The following conventions are used in this guide:

Convention	Meaning
`system displays`	Terminal sessions and information the system displays are printed in monospace type.
boldface	Information you enter is in boldface type. Keywords are also in boldface type.
>	Nonprinting characters are shown in angle brackets.
[ ]	Defaults are in square brackets.
COMMANDS	Commands are in uppercase letters.
italics	Command variables, worksheet values, new terms and concepts, and titles of books and periodicals are in italics.
Ctrl/X	Indicates two keys that you must press simultaneously.
Note	Provides general information about the current topic.
Caution	Provides information to prevent damage to equipment.

If the no form of the command is not explicitly explained in the description, then it negates the command.

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 follows:

  ```
  Router>
  ```

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

  ```
  Router#
  ```

- Use the following editing commands when typing commands at the EXEC prompt:

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

- As a shortcut, you can abbreviate commands to the fewest letters that make them unique. 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; type any other key to return to the prompt.

System Help

- Press the question mark (?) key or the h key (for help) to see a list of available commands at either the user-level or the privileged-level EXEC prompt.

- Press the question mark (?) key after certain commands to get more information about them. See the command lists for more information.

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

```
Ctrl ^ ?
```

Press the Ctrl and Shift keys and 6 keys simultaneously, let go, then enter the question mark (?).

CONFIGURE Command

Use the privileged EXEC command configure to begin configuration of the router.

- Begin by entering the privileged level of the EXEC. To do this, type the enable command at the EXEC prompt:

```
Router> enable
```

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

```
Password:
```

- 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#

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

```
Router# configure
```

When you enter this command, the EXEC prompts you for the source of the configuration subcommands.

```
Configuring from terminal, memory, ornetwork [terminal]?
```

The default is to type in commands from the terminal console. Pressing the Return key begins this configuration method.

- 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 functions and their meanings.

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

Press Ctrl/Z to end configuration mode. Enter the disable EXEC command to return to the user-level EXEC prompt.

Configuration Command Types

Configuration commands are categorized by these functions:

- Global configuration commands—Define system-wide parameters.

- Interface subcommands—Define the characteristics of an interface (a serial or Ethernet interface, for example) and must be preceded by an interface command.

- Line subcommands—Define the characteristics of a serial line and must be preceded by a line command.

- Router subcommands—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 subcommands in uppercase letters, lowercase letters, or both. You also can shorten all commands and other keywords to the fewest number of characters that uniquely identify the word.

- To add a comment, begin the line with an exclamation point (!). Comments do not affect command processing.

- If the router encounters a problem, it displays an error message on the console terminal.

1

System Use Commands

1.1 EXEC Terminal Use Commands

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

Connects to a remote host using the Telnet protocol.

- **Connect** or **telnet** — Use ether of the two keywords.
- Connection—Host name or IP address

Example
```
connect router
```

---

disconnect [*connection*]

Closes a connection.

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

Example
```
disconnect 2
```

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

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

---

name-connection

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

---

resume [*connection*]

Resumes a connection.

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

Example
```
resume 3
```

---

where

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

1.2 EXEC Terminal Parameter Setting Commands

---

terminal ?

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

---

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

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

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

---

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

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

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

Example
```
terminal escape-character 17
```

---

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

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

- **7**—Sets 7-bit ASCII character set (default).

- **8**—Sets 8-bit ASCII international character set in prompts and banners.

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

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

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

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

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

Establishes or removes message notification.

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

Sets or cancels character padding on the current terminal line.

- *decimal-number*—ASCII decimal representation of the character.

- *count*—Number of NULL bytes sent after that character.

Example
```
terminal padding 25 20
```

---

terminal 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.

- **7**—Sets the 7-bit ASCII character set (default).

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

---

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

Records, removes, or changes the current terminal type.

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

Example

```
terminal terminal-type VT100
```

---

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

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

- *column*—Number of columns.

Example

```
terminal width 132
```

1.3 System Use Show Commands

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

2

System Management Commands

2.1 EXEC System Management Commands

---

clear line *line-number*

Aborts connections and processes and resets a terminal line.

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

Example
```
clear line 3
```

---

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 (Must be in bootstrap mode).

---

copy MOP flash

Copies a MOP image into flash memory (Must be in bootstrap mode).

---

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 DIGITAL technical personnel.

――

ping

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

show ?

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

test interfaces

Intended for use by DIGITAL 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.

undebug *option*

Disables diagnostic output enabled by DEBUG command option.

Examples
```
debug packet
undebug packet
```

write erase

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

write memory

Copies the current configuration information 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 file name.

write terminal

Displays the current configuration information.

2.2 System Management Show Commands

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

3

System Configuration Commands

3.1 System Global Configuration Commands

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

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

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

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

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

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

- **bytes**—Size of the buffer.

Example
```
boot buffersize 64
```

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

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

- **host**—Changes host configuration filename.
- **network**—Changes network configuration filename.
- *filename*—New name for the host configuration file or filename of operating system to load.

- **address**—Network host or a subnet broadcast address. Default is
  255.255.255.255.

Examples
```
boot host config1
boot network config2
```

[**no**] **boot system flash** *filename*

Configures the system image boot files to boot the system from Flash memory.

- *filename*—File name of the image from Flash memory.

Example
```
boot system flash sysimage
```

> ───────────────────── **Note** ─────────────────────
>
> This command is superfluous on the DECbrouter 90, which in normal
> operation loads only from a single image in flash.

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

Configures the system to auto-boot from the ROM system image. Do not use
this command on the DECbrouter 90. You will be unable to boot flash without
corrupting your non-volatile RAM.

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

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

- **small** | **middle** | **big** | **large** | **huge**—Size of buffers in the pool. The default
  number is determined by the hardware configuration.

- **permanent** | **max-free** | **min-free** | **initial**—Buffer management
  parameter to be changed.

- *number*—Number of buffers to be allocated.

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

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

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

- *number*—Size of huge buffers.

Example
```
buffers huge size 20000
```

config-register *value*

Upon system restart, changes software configuration register settings.

- *value*—Register number to be set in hexadecimal. Common values: 0x102 sets system to boot from Flash; 0x101 sets system to enter bootstrap mode; 0x101 sets the default switch register contents; 0x100 boots from the ROM monitor.

Example
```
config-reg 0x101
```

───────────────────── **Note** ─────────────────────

This command does not require a **write mem** to take effect on the next boot.

──

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.

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

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

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

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

- *dialer-group0*—Number of a dialer group identified in any DIALER GROUP interface subcommand.

- **list** *list-number*—Access list number specified in any IP or bridging access list.

- **protocol** *protocol-name*—One of the following supported protocols: **ip, decnet, chaos, xns, novell, appletalk, vines, apollo, pup, clns, bridge** (bridging), **stun** (serial tunneling), or **cmns** (OSI Connection-Oriented Network Service).

- **permit** or **deny**—Specifies whether automatic dialing is permitted or denied.

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

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

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

- **succeed** or **password**—Use **succeed** to enable without further question. Use **password** to enable 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
```

interface dialer *number*

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

Example
```
interface dialer 1
encapsulation ppp
dialer map ip 131.108.2.5 username zebra 1415553434
```

interface *type unit*

Specifies an interface and begins interface configuration.

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

- *unit*—Interface number or card number.

Example
```
interface serial 0
interface ethernet 0
```

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

Identifies a specific line for configuration and starts line configuration.

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

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

- *last-line*—If *type-keyword* is specified, provide the relative number (last line) in a contiguous group you want to configure. If *type-keyword* is not specified, provide the absolute number.

Example
```
line vty 0 4
```

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

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

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

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

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

- **emergencies**—System unusable
- **alerts**—Immediate action needed
- **critical**—Critical conditions
- **errors**—Error conditions
- **warnings**—Warning conditions
- **notifications**—Normal but significant conditions
- **informational**—Informational messages only
- **debugging**—Debugging messages

Example
```
logging console emergencies
```

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

Identifies a syslog server host to receive logging messages.

- *IP-address*—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.

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

Example
```
logging monitor notifications
```

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

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

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

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

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

Example
```
logging trap errors
```

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

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

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

Example
```
priority list 2 default medium
```

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

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

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

Example
```
priority list 1 interface ethernet 0 medium
```

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

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

- *protocol-name*—Name of the protocol: **ip, pup, chaos, xns, decnet, appletalk, clns, novell, apollo, vines, stun, bridge,** or **rsrb**.
- *list*—Integer from 1 to 10 that identifies the priority list selected by the user.
- *queue-keyword*—Priority queue name: **high, medium, normal,** or **low**.

The optional keyword *args* is one of the following:

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

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

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

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

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

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

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

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

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

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

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

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

- **stun**—Indicates that this is a serial tunnel feature.

- *queue-keyword*—Priority queue name: **high, medium, normal,** or **low**.

- *address*—Identifies a STUN serial link.

- *group-number*—STUN group number.

- *address-number*—Address of the serial link.

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

[**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** *keyword*

Tailors use of network-based services by the router.

The argument *keyword* is one of the following:

- **config**—Specifies TFTP autoloading of configuration files; enabled by default on systems with blank nonvolatile memory.

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

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

- **password-encryption**—Enables encrypted passwords.

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

- **timestamps**—Precedes system error message output with system uptime.

Example
```
no service config
```

---

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.

- *string*—Community string that acts like a password and permits access to the SNMP protocol.

- **RO** or **RW**—The **RO** keyword specifies read-only access (default); the **RW** keyword specifies read-write access.

- *list*—Integer from 1 through 99 that specifies an access list of Internet addresses that can use the community string.

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

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

Specifies which host or hosts should receive TRAP messages.

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

- *community-string*—Your community string, similar to a password, that you set with the SNMP-SERVER COMMUNITY command.

  The keywords **snmp** or **tty** specify the TRAP type, as follows:

- **snmp**—Sends all SNMP-type TRAP messages and starts the DECbrouter 90T specific RELOAD TRAP message.

- **tty**—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 DECbrouter 90T.

[**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.

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

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

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

- *count*—Number of attempts.

Example
```
tacacs-server attempts 6
```

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

Specifies that a response is required from the router 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 router 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 five 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.

- *retries*—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
```

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

Specifies or removes TFTP server operation for the router.

- *filename*—Name of the router ROM file.

- *access*—list-IP access list number.

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

---

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

Implements a 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**—No password is required for this user to log in.

- **password**—Specifies a possibly encrypted password for this user name.

- *encryptiontype*—Single-digit number. Currently defined encryption types are zero, which means no encryption, and seven, which specifies a DECbrouter 90T- defined encryption algorithm.

- *password*—The password you enter for authentication.

- *secret*—Specifies the secret (a special password) for the local router server or remote device.

- **accesslist** *number*—Specifies an outgoing access list that overrides the access list specified in the ACCESS CLASS line configuration subcommand.

- **autocommand** *command*—Causes the command specified to be issued automatically after the user logs in.

- **noescape**—Prevents user from having an escape character with which to escape from the host system.

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

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

3.2 Line Configuration Subcommands

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

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

- **8**—Sets full 8-bit ASCII international character set (default).

- **7**—Sets 7-bit ASCII character set when connections are to hosts that routinely send parity over the network.

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

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

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

Example
```
escape-character 13
```

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

Enables or disables a banner. Default is enabled.

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

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

- **7**—Sets 7-bit ASCII character set (default).

- **8**—Sets 8-bit ASCII international character set in prompts and banners.

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

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

- *minutes*—Number of minutes. The default interval is ten minutes.

- *seconds*—Number of seconds; an interval of zero specifies no timeouts.

Example
```
exec-timeout 15 30
```

[**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 and/or status.

• *text*—Desired description.

Example
```
location In the hall
```

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

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

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

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

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

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

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

Sets or cancels character padding for a specified output character.

• *decimal-number*— ASCII decimal representation of the character.

• *count*—Number of NULL bytes sent after the character.

Example
```
padding 13 25
```

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

Specifies a password.

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

Example
```
password yourpassword
```

---

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.

- **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.

---

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

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

- *c*—Delimiting character that you will use to signify the beginning and end of the banner message.

- *message*—Message to be shown on the screen whenever an interface line is activated.

Example
```
vacant-message #
    Welcome to Digital Equipment Corporation.
#
```

4

Interface and Media Configuration

4.1 Interface Configuration Subcommands

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

Defines how much time should elapse before a line is set up or taken down.

- *enable-delay*—Number of seconds after the primary line goes down until the secondary line is activated. The **never** keyword prevents the line from ever coming up because of the primary going down.

- *disable-delay*—Number of seconds after the primary line goes up before the secondary line is deactivated. The **never** keyword prevents the line from ever going down because of the primary coming up.

Example
```
backup delay 10 never
backup delay 30 60
```

[**no**] **backup interface** *interface-name*

Configures the serial interface as a secondary line (dial backup line). The **no** form removes this configuration.

- *interface-name*—Serial port to be set as the secondary interface line.

Example
```
backup interface serial 1
```

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

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

- *enable-threshold* and *disable-load*—Numbers representing the transmitted load as a percentage of the primary line's available bandwidth.

- **never**—Prevents the secondary line from being enabled or disabled because of load.

Example
```
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**] **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** *name-string*

Adds a descriptive name to an interface.

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

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

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

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

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

Example
```
dialer enable-timeout 10
```

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

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

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

Example
```
dialer fast-idle 30
```

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

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

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

Example
```
dialer-group 3
```

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

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

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

```
dialer idle-timeout 180
```

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

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

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

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

- *protocol*—Supported protocol; currently must be **ip**.

- *next-hop-address*—IP address used to compare against addresses to which packets are destined.

- **username** *name*—Specifies a remote system with which the local router communicates.

- *dial-string*—Telephone number sent to the DCE dialing device when packets with the specified *next-hop-address* are seen.

Examples

```
dialer map ip 131.108.2.5 14155553434
dialer map ip 131.108.2.5 username ZZZ 1415555343
```

---

dialer rotary-group *number*

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

Example

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

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

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

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

Example

```
dialer string 14155553434
```

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

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

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

Example

```
dialer wait-for-carrier-time 5
```

---

encapsulation *encapsulation-type*

Assigns an encapsulation method.

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

- **arpa**—Ethernet version 2.0 encapsulation
- **bfex25**—Blacker Front End Encryption X.25 operation
- **ddnx25**—DDN X.25 DTE operation
- **ddnx25-dce**—DDN X.25 DCE operation

- **frame-relay** [**ietf**]—Frame relay and optional IETF encapsulation
- **hdh**—HDH protocol
- **hdlc**—HDLC protocol
- **iso1**—IEEE 802.3 encapsulation
- **lapb**—X.25 LAPB DTE operation
- **lapb-dce**—X.25 LAPB DCE operation
- **multi-lapb**—X.25 LAPB multiprotocol DTE operation
- **multi-lapb-dce**—X.25 LAPB multiprotocol DCE operation
- **ppp**—Point-to-Point Protocol (PPP)
- **sdlc-primary**—Primary SDLC station
- **sdlc-secondary**—Secondary SDLC station
- **smds**—SMDS service
- **snap**—IEEE 802.2 Ethernet media
- **stun**—STUN functionality
- **x25**—X.25 DTE operation
- **x25-dce**—X.25 DCE operation

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

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

- *length*—Maximum number of packets in the queue.
- **in** or **out**—Use **in** to specify the input queue; use **out** to specify the output queue.

Example
```
hold-queue 40 in
```

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

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

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

Example
```
keepalive 3
```

[**no**] **loopback**

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

[**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 inter-faces.

Example
```
mtu 576
```

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

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

priority-group *list*

Assigns a priority group to an interface.

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

Example
```
priority-group 1
```

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

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

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

Example
```
pulse-time 3
```

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

Disables or enables an interface.

- *interface*—Interface name.

Example
```
shutdown ethernet0
```

[**no**] **transmitter-delay** *HDLC-flags*

Specifies the minimum number of HDLC flags that the router should send between packets. The **no** form restores the default of zero flags.

- *hdlc-flags*—Number of HDLC flags. Valid range is 2 to 62.

Example
```
transmitter-delay 40
```

4.2 EXEC Interface Management Commands

clear counters [*type unit*]

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

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

Examples
```
clear interface serial 0
clear interface ethernet 0
```

4.3 Interface Management Show Commands

Command		Display
show controllers	**serial**	Current internal status information for different interface cards
show dialer interface [*interface unit*]		Information about dialer interfaces or a specific interface when optional interface type is specified.
show interfaces	**ethernet** [*unit*] **serial** [*unit*]	Network interface statistics. Argument unit is the interface unit or card number. Keywords 1 and 2 indicate B channels 1 and 2 on the Basic Rate Interface (BRI).
show interfaces [*interface unit*] [*accounting*]		Number of packets of each protocol type that have been transmitted through the interface.

4.4 Frame Relay Interface Subcommands

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

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

* *seconds*—Keepalive interval in seconds.

Example
```
frame-relay keepalive 15
```

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

Specifies the exchange of local management interface messages as defined by ANSI standard T1.617. The **no** form restores the LMI type to the default as defined by the Cisco/StrataCom/Northern Telecom/Digital 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.

* *protocol*—One of these keywords: **ip, decnet, appletalk, xns, novell, vines,** or **clns**.

* *protocol-address*—Protocol address.

* *DLCI*—DLCI number.

- **broadcast**—Specifies that broadcasts should be forwarded to this address when the multicast is not enabled.

- **ietf**—Selects RFC 1294 Frame Relay encapsulation.

Examples

```
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 short-status**

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

4.5 Frame Relay Show Commands

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

4.6 SMDS Global Command

arp *IP-address SMDS-address* **smds**

Allows inclusion of static ARP entries.

- *IP-address*—IP address.

- *SMDS-address*—SMDS address.

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

4.7 SMDS Interface Subcommands

[**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 d15-mode**

Enables or disables AT&T's d15 packet structure. Default is enabled.

[**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
```

4.8 SMDS Show Commands

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.

4.9 X.25 EXEC Command

---

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

Implements Blacker Front End Emergency (BFE) Mode when the X25 BFE-DECISION ASK configuration command is set.

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

Example
```
bfe leave serial 1
```

4.10 X.25 Global Configuration Commands

[**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.

- *#position*—Positional parameter that indicates the existing entry after which the current entry will be inserted or deleted. See following table for pattern matching characters.
- *X.121-patt*—X.121 address of the called destination. Tables below list pattern matching characters.
- **cud** *patt*—Call User Data and pattern, or regular expression that must match the called address.
- **interface** *int-name*—Interface name.
- **ip** *IP-address*—IP address.
- **alias**—Treats X.121 addresses as local.
- **substitute-source**—Allows substitution of the calling address.
- **substitute-dest**—Allows substitution of the destination address.
- *pattern*—Replaces the called or calling X.121 address in routed X.25 packets.
- **interface** *destination*—Destination address of the specified interface.

Use the following table for pattern matching.

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

Example

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

[**no**] **x25 routing**

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

4.11 LAPB and X.25 Interface Subcommands

[**no**] **cmns enable**

Enables or disables CMNS on a nonserial interface.

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

Enables the packet or message mode of the HDH protocol.

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

lapb k *window-size*

Defines the maximum permissible number of outstanding LAPB frames.

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

Example
```
lapb k 4
```

---

lapb n1 *bits*

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

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

Example
```
lapb n1 6000
```

---

lapb n2 *retries*

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

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

Example
```
lapb n2 100
```

---

lapb t1 *milliseconds*

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

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

Example
```
lapb t1 32000
```

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

Instructs the router to accept all reverse charge calls by default. This behavior also can be configured on a peer-to-peer basis using the X25 MAP subcommand. The **no** form disables this feature.

---

x25 address *X.121-address*

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

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

Example
```
x25 address 31370054065
```

***

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

Indicates decision criteria for X25 BFE-EMERGENCY DECISION command.

- **no**—Router will not participate in decision to enter or leave emergency mode.

- **yes**—Router will participate in decision to enter emergency mode.

- **ask**—Router will prompt for EXEC command to place it in or out of emergency mode.

Example
```
x25 bfe-decision ask
```

***

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

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

- **never**—Router never goes into mode (default).

- **always**—Router enters when directed by the BFE.

- **decision**—Router waits until it receives a diagnostic packet from the BFE device.

Example
```
x25 bfe-emergency always
```

***

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

Specifies or removes a protocol by which the router interprets calls with unknown Call User Data. The protocol is either **ip** or **pad**.

***

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

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

Choose one of the following keyword-argument pairs:

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

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

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

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

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

- **rpoa** *name*—Specifies the list of transit Recognized Private Operating Agencies (RPOAs) to use in outgoing Call Request packets.

- **transit-delay** *number*—Specifies the transit delay value in milliseconds (0 to 65334) for the mapping in of outgoing 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 until a virtual circuit is established. The **no** form restores the default of zero.

- *queue-size*—Number of packets.

Example

```
x25 hold-queue 3
```

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

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

- *minutes*—Number of minutes to prevent calls 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.

Example
```
x25 htc 512
```

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

Sets the period of inactivity once an SVC has been cleared. Affects calls both originated and terminated by the router. 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 a new virtual circuit based on the IP Type of Service (TOS) field. By default, the router opens one virtual circuit for each type of service.

---

x25 ips *bytes*

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

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

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 is restarted. Restarts X.25 Level 2 (LAPB) when errors occur. The **no** form turns off this behavior. Default is enabled.

---

x25 loc *circuit-number*

Sets the lowest outgoing-only virtual circuit number. Default is 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* [*option1... option6*]

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

- *protocol-keyword*—Protocol type: **ip, decnet, chaos, xns, novell, appletalk, vines, apollo, pup, clns, bridge, cmns,** or **compressedtcp**.
- *protocol-address*—Protocol address to be mapped.
- *X.121-address*—X.121 address to which the protocol address will be mapped.

  Choose up to six of the following mapping features for the *option* argument (not for use with X25 MAP CMNS command):

- **accept-reverse**—Instructs the router to accept incoming reverse- charged calls. If this option is not present, the router clears reverse-charged calls.
- **broadcast**—Instructs the router to direct any broadcasts sent through this interface to the specified X.121 address. This option is needed when dynamic routing protocols are being used to access the X.25 network.

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

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

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

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

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

- **reverse**—Specifies reverse charging for outgoing calls.

- **rpoa**—Specifies the list of transit Recognized Private Operating Agencies to use in outgoing Call Request packets for this entry.

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

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

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

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

---

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

Specifies Internet-to-X.121 mapping.

- *X.121-address*—X.121 address.

- **broadcast**—Bridges X.25 frames.

- *options-keywords*—Services that can be added to this map. See the X25 MAP command for options.

Example
```
x25 map bridge 31370054065 broadcast
```

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

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

- *NSAP*—DTE NSAP address or NSAP prefix of NSAP address.

- *MAC-address*—MAC address.

- *X.121-address*—X.121 address.

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

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

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

- *IP-address*—IP address.

- *X.121-address*—X.121 address.

- *options*—See the X25 MAP command for options.

Example
```
x25 map compressed 131.108.9.2 31370054065
```

---

x25 modulo *modulus*

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

- *modulus*—8 or 128.

Example
```
x25 modulo 128
```

---

x25 nvc *count*

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

- *count*—Circuit count from 1 to 8.

Example
```
x25 nvc 3
```

---

x25 ops *bytes*

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

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

Example
```
x25 ips 1024
```

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

Establishes or deletes Permanent Virtual Circuits (PVCs). You must specify the required network protocol-to-X.121 address mapping with an X25 MAP subcommand before you can set up a PVC.

- *circuit*—Virtual circuit channel number. Must be lower than the lower limit of the incoming call range in the virtual circuit channel sequence (set using the **lic** keyword).

- *protocol-keyword*—Protocol type: **ip, decnet, chaos, xns, novell, appletalk, vines, apollo, pup, clns, bridge,** or **cmns**.

- *protocol-address*—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 a given interface.

- *pvc-number*—PVC number; the first is the number used on the local interface, the second is the number on the remote interface.

- **interface** *interface-name*—Remote interface type and unit number.

- *options*—The **windowsize** and **packetsize** options can be entered; see the X25 MAP command options for syntax.

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

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

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

- *host-IP-address*—IP address of a host or router to which packets are sent.

- **remote-black**—Specifies remote Blacker Front End unit.

- *Blacker-IP-address*–IP address of remote Blacker Front End unit in front of the host to which packets are sent.

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

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

Specifies a list of transit Recognized Private Operating Agencies (RPOAs) to use, referenced by name.

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

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

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

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

x25 t10 *seconds*

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

- *seconds*—Number of seconds.

Example
```
x25 t10 90
```

x25 t11 *seconds*

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

- *seconds*—Number of seconds.

Example
```
x25 t11 90
```

x25 t12 *seconds*

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

- *seconds*—Number of seconds.

Example
```
x25 t12 90
```

x25 t13 *seconds*

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

- *seconds*—Number of seconds.

Example

```
x25 t13 90
```

x25 t20 *seconds*

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

- *seconds*—Number of seconds.

Example

```
x25 t20 90
```

x25 t21 *seconds*

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

- *seconds*—Number of seconds.

Example

```
x25 t21 220
```

x25 t22 *seconds*

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

- *seconds*—Number of seconds.

Example

```
x25 t22 100
```

x25 t23 *seconds*

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

- *seconds*—Number of seconds.

Example

```
x25 t23 200
```

x25 th *delay*

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

- *delay*—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 prevents the update.

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

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

- **win**—Use the keyword **win** to specify the upper limits of the number of outstanding unacknowledged packets in the input window.

- **wout**—Use the keyword **wout** to specify the upper limits of the number of outstanding unacknowledged packets in the output window.

- *packets*—Packet count. For **win**, defines how many packets the router can receive before sending an X.25 acknowledgment. For **wout**, defines how many sent packets can remain unacknowledged before the router uses a hold queue. The value must be between one and modulus minus one.

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

4.12 X.25 Show Commands

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

5

Protocol Configuration

5.1 Apollo Domain Global Configuration Commands

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

Specifies Apollo Domain access conditions.

- *name*—Defined by the network administrator for the access list.
- *firstnet-* and *lastnet.host*—First and last numbers in a network range. Use the argument *lastnet.host* to specify a single network.
- **permit** or **deny**—Specifies permit or deny condition for this list.
- *wildcard-mask*—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 one.

- *paths*—Number of paths to be assigned.

Example
```
apollo maximum-paths 5
```

[**no**] **apollo route** *network network.address*

Specifies static routes for an Apollo Domain network.

- *network*—Network number.
- *network.address*—Address to which to forward packets.

Example
```
apollo route 45 17.32
```

[**no**] **apollo routing** *address*

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

- *address*—Unique, five-digit hexadecimal host address.

Example
```
apollo routing 1293c
```

5.2 Apollo Domain Interface Subcommands

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

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

- *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** *seconds*

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

- *seconds*—Number of seconds between updates. The minimum value is 10
  seconds.

Example
```
apollo update-time 20
```

5.3 Apollo Domain Show Commands

Command	Display
show apollo arp	Portion of Address Resolution Protocol (ARP) table pertaining to Apollo Domain ARP.
show apollo interface [*interface unit*]	Apollo Domain parameters that have been configured on the interfaces.
show apollo route	Apollo Domain routing table.
show apollo traffic	Number and type of Apollo Domain packets transmitted and received.

5.4 AppleTalk Global Configuration Commands

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

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

- *list*—An integer between 600 and 699.

- **permit** or **deny**—Specifies the permit or deny condition.

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

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

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

- *list*—An integer between 600 and 699.

- **permit** or **deny**—Specifies the permit or deny condition.

- *start-end*—The cable range.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

no appletalk arp

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

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

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

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

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

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

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

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

Example
```
appletalk arp interval 100
```

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

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

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

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

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

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

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

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

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

- *IP-address*—The IP address. To specify a range, supply the first and last IP addresses separated by a space.

- *server-zone*—The name of the zone containing the MacIP server.

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

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

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

- *IP-address*—The IP address. You can optionally specify a range by supplying the first and the last IP address.

- *server-zone*–The name of the zone containing the MacIP server.

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

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

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

- *IP-address*—The IP address. You can optionally specify a range by supplying the first and the last IP address.

- *server-zone*—The name of the zone containing the MacIP server.

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

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

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

- *network-number*—Unique network number that the router will advertise as if it were a real network number.

- *zonename*—Name of the zone requiring compatibility support. Only one proxy is needed to support a zone, but additional proxies can be defined with different network numbers if redundancy is desired.

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

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

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

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

Enables or disables AppleTalk protocol processing.

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

Enforces maximum checking of routing packets to ensure their validity.

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

Changes the intervals used in AppleTalk routing.

- *update-interval*—Number of seconds between routing updates sent to other routers on the network. Default is 10 seconds.

- *valid-interval*—Number of seconds that the router will consider a route valid without having heard a routing update for that route. The value is normally twice the *update-interval*. Default is 20 seconds.

- *invalid-interval*—Number of seconds that the router will wait before marking a route invalid; the default is three times the *valid-interval*, or 60 seconds.

Example
```
appletalk timers 20 40 120
```

5.5 AppleTalk Interface Subcommands

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

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

- *access-list-number*—Number of an access list in the range 600 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 through the **other-access** option of the ACCESS-LIST global configuration command.

Example
```
appletalk access-group 699
```

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

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

- *address*—AppleTalk address.

Example
```
appletalk address 1.129
```

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

Designates an interface as being on an extended AppleTalk network.

- *start-end*—First and last network in the range expressed as decimal numbers between 1 and 65279, inclusive. The arguments start and end can be assigned the same number.

- *network.node*—Network and node number that the router should first use to select the AppleTalk address for this interface.

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

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

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

---

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

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

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

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

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

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

- *access-list-number*—Access list number in the range 600 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 getzonelist-filter** *list*

Modifies zone-list replies.

- *list*—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
```

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
```

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.

Example
```
appletalk iptalk-baseport 200
```

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

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

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

Sets the zone name for the connected AppleTalk network. Must be specified after the APPLETALK ADDRESS or APPLETALK CABLE-RANGE command if discovery is not enabled. This command can be issued multiple times if it follows the APPLETALK CABLE-RANGE command.

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

Example
```
appletalk zone twilight
```

5.6 AppleTalk Show Commands

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

5.7 CHAOSnet Global Configuration Command

[**no**] **router chaos**

Starts or stops the CHAOSnet router process.

5.8 CHAOSnet Show Command

Command	Display
show chaos-arp	CHAOSnet-specific ARP entries as 16-bit octal addresses.

5.9 DECnet Global Configuration Commands

---

access-list *list* {**permit** | **deny**} *destination destination-mask*

Creates a DECnet access list.

- *list*—An integer between 300 and 399 that uniquely identifies the access list.

- **permit** or **deny**—Specifies permit or deny condition for this list.

- *destination*—DECnet address.

- *destination-mask*—The mask, expressed in DECnet address format, with bits set wherever the corresponding bits in the address should be ignored.

Examples
```
access-list 300 deny 4.51 0.0
access-list 300 permit 2.31 0.0
```

[**no**] **access-list** *list* {**permit** | **deny**} *source source-mask* [*destination destination-mask*] [*connect-entries*]

Filters *connect initiate* packets by DECnet object type.

- *list*—Access list number in the range 300-399.

- **permit** or **deny**—Specifies permit or deny condition for this list.

- *source source-mask*—Source address and mask.

- *destination destination-mask*—Destination address and mask.

  The *connect-entries* argument specifies the entries used to match connect packets. Use the command syntax {**eq** | **neq**} [*src-object*] [*dst-object*] [*identification*]

- **eq** or **neq**—The keyword **eq** specifies that the item matches the packet if all the specified parts of *src-object, dst-object,* and *identification* match data in the packet. The keyword **neq** specifies that the item matches the packet if any of the specified parts do not match the corresponding entry in the packet.

- *src-object*—The keyword **src** and the argument *obj-spec*.

- *dst-object*—The keyword **dst** and the argument *obj-spec*.

- *identification*—The keyword **id, password,** or **account**, followed by the argument *regex*.

- *obj-spec*—One of the following: *relop object-number*, **exp** *regex*, **uic** [*group,user*]; with the latter, the bracket symbols must be entered.

- *relop*—One of the following relational operator keywords: **eq** (equal to), **neq** (not equal to), **lt** (less than), **gt** (greater than).

- *object-number*—Numeric DECnet object number.

- *regex*—Regular expression that matches a string.

- [*group, user*]—Numeric UID expression expressed in decimal, octal, or hexadecimal format.

The argument *obj-spec* is the object specifications, in one of three formats:

- Relational operator and an object number (eq 17).
- Regular expression that matches a string (exp ^SYSTEM$).
- Matches a UIC (uic [1,4]).
- **id, password,** or **account**—Type of value that the argument *regex* should match. The special format **eq any** matches any connect packet.

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
```

---

decnet area-max-cost *value*

Sets the maximum cost specification value for interarea routing.

- *value*—Maximum cost for a route that the router considers usable. The router treats as unreachable any route with a cost greater than the value you specify. The valid range is from 1 to 1022.

Example

```
decnet area-max-cost 500
```

---

decnet area-max-hops *value*

Sets the maximum hop count specification value for interarea routing.

- *value*—Maximum number of hops for a route to a distant area that the router may consider usable; the router treats as unreachable any route with a counter greater than the value you specify. The valid range is from 1 to 30.

Example

```
decnet area-max-hops 21
```

---

decnet conversion *NSAP-prefix*

Enables conversion.

- *NSAP-prefix*—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.

- *first-network*—First DECnet network number, in the range 0 to 3.

- **map** *virtual-address*—Numeric DECnet address that you want to translate to a real address.

- *second-network*—Second DECnet network number, in the range 0 to 3.

- *real-address*—Real DECnet address to which you want to translate the virtual address.

Example
```
decnet 0 map 19.5 1 50.1
```

---

decnet *network-number keywords*

Specifies ATG (Address Translation Gateway).

- *network-number*—Network number, in the range 0 to 3. To configure network 0, do not include the network-number modifier.

- *keywords*—One of the DECnet global configuration command keywords; for example, **area-max-cost** or **max-units**.

Examples
```
decnet 1 node-type area
decnet 0
```

---

decnet max-address *value*

Determines the largest node number specification allowed in the current area. Default is 255.

- *value*—Node number from 1 to 1023; default is 255.

Example
```
decnet max-address 300
```

---

decnet max-area *value*

Determines the largest node number specification allowed in the current area.

- *value*—Largest area number specification the router can handle from 1 to 63.

Example
```
decnet max-area 30
```

---

decnet max-cost *value*

Sets the largest maximum cost specification for intra-area routing.

- *value*—Number from 1 to 1022.

Example
```
decnet max-cost 500
```

---

decnet max-hops *value*

Sets the maximum hop count specification for intra-area routing.

- *value*—Hop count from 1 to 30.

Example
```
decnet max-hops 30
```

---

decnet max-paths *value*

Defines the maximum number of equal cost paths to a destination that the router can maintain. Default is 1 (no multiple paths).

- *value*—Maximum number of equal cost paths from 1 to 31.

Example
```
decnet max-paths 2
```

---

decnet max-visits *value*

Sets the limit on the number of times a packet can pass through a router.

- *value*—Number of times from 1 to 63.

Example
```
decnet max-visits 15
```

---

decnet node-type {**area** | **routing-iv**}

Specifies the node type for the router.

- **area** or **routing-iv**—Specify **area** to make the router exchange traffic directly with routers in other areas, participate in the interarea (Level 2) routing protocol, and act as an intra-area (Level 1) router for its local area. Specify **routing-iv** to make the router act as an intra-area router and route packets out of the area by taking the least cost path to an interarea router.

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
```

[**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 routing** *DECnet-address*

Enables or disables DECnet routing for a particular area and node.

• *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
```

5.10 DECnet Interface Subcommands

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

Interface subcommand 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 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
```
decnet cost 4
```

[**no**] **decnet 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
```
decnet hello-timer 120
```

[**no**] **decnet 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
```
decnet 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.

[**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
```

5.11 DECnet Show Commands

Command	Display
show decnet interface [*interface*]	DECnet parameters that have been configured on the interfaces.
show decnet map	Address mapping information used by the DECnet Address Translation Gateway.
show decnet route	DECnet routing table.
show decnet traffic	DECnet traffic statistics including datagrams sent, received, and forwarded.

5.12 IP and SLIP Global Configuration Commands

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

Creates or removes an IP access list.

- *list*—An IP list number from 1 to 99.

- **permit** or **deny**—Specifies permit or deny condition for this list.

- *IP-address*—IP address to which the router compares the address being tested.

- *wildcard-mask*—Wildcard mask bits for the address in 32-bit, dotted decimal notation.

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

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

Creates or removes an extended IP access list.

- *list*—An IP list number from 100 to 199.

- **permit** or **deny**—Specifies permit or deny condition for this list.

- *protocol*—One of the supported protocol keywords: **ip, tcp, udp,** or **icmp**.

- *source*—An IP address in 32-bit, dotted decimal notation.

- *source-mask*—Mask bits for the source address in 32-bit, dotted decimal notation.

- *destination*—Destination address in 32-bit, dotted decimal notation.

- *destination-mask*—Destination address mask in 32-bit, dotted decimal notation.

- *operator*—If **tcp** or **udp** is the protocol, use these optional arguments to compare destination ports, service access points, or contact names. Specify **lt** (less than), **gt** (greater than), **eq** (equal to), or **neq** (not equal).

- *operand*—If **tcp** or **udp** is the protocol, specify the decimal destination port for the specified protocol.

- **established**—For the TCP protocol, use the **established** keyword to match TCP datagrams that have the ACK or RST bits set.

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

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

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

- *IP-address*—The Internet address that corresponds to the local data-link address specified by the argument *hardware-address*.

- *hardware-address*—Local data-link address.

- *type*—Encapsulation description: **arpa** for Ethernet interfaces.

- **alias**—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**] **ip accounting-list** *IP-address mask*

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

- *IP-address*—IP address for the host.

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

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 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 dec.com
```

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

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

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

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

- *name*—Default domain name.

Example
```
ip domain-name DIGITAL.com
```

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

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

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

Example
```
ip forward-protocol udp
```

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

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

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

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

- *name*—Host name.

- *TCP-port-number*—TCP port number. Default is 23 (Telnet).

- *IP-address*—IP address associated with the host name. Up to eight addresses can be supplied.

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 ipname-lookup**

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

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

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

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

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.

5.13 IP Interface Subcommands

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

Controls the interface-specific handling of IP address resolution into 48-bit
Ethernet 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** *list*

Defines an IP access group.

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

Example
```
access-group 101
```

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

Enables or disables IP accounting on an interface.

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

Sets an IP address for an interface.

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

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

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

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

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

Example
```
ip broadcast-address 121.24.43.2
```

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

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

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

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

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

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

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

[no] ip security

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

[no] ip security add

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

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

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

- *level*—Degree of sensitivity of information: **reserved4, TopSecret, Secret, Confidential, Reserved3, Reserved2, Unclassified,** or **Reserved1**.

- *authority*—Organization that defines the set of security levels that will be used in a network: **Genser, Sio-Esi, SCI,** or **NSA**.

Example
```
ip security dedicated confidential Genser
```

[no] ip security extended-allowed

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

[no] ip security first

Prioritizes the presence of security options on a datagram.

[no] ip security ignore-authorities

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

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

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

- *level*—Degree of sensitivity of information: **reserved4, TopSecret, Secret, Confidential, Reserved3, Reserved2, Unclassified,** or **Reserved1**.

- *authority*—Organization that defines the set of security levels that will be used in a network: **Genser, Sio-Esi, SCI,** or **NSA**.

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

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

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

- *level*—Degree of sensitivity: **reserved4, TopSecret, Secret, Confidential, Reserved3, Reserved2, Unclassified,** or **Reserved1**.

- *authority*—Organization that defines the set of security levels that will be used in a network: **Genser, Sio-Esi, SCI,** or **NSA**.

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

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

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

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

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

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

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

• *number*—Number of connections from 3 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**—Sets the interface to compress outgoing traffic on the inter- face 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 unreachables**

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

transmit-interface *interface-name*

Assigns a transmit interface to a receive-only interface.

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

Example
```
transmit-interface ethernet 0
```

5.14 IP Line Subcommand

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

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

* *list*—An integer from 1 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
```

5.15 IP Routing Protocols Global Configuration Commands

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

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

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

Example
```
autonomous-system 109
```

[**no**] **ip as-path access-list** *list* {**permit** | **deny**} *as-regular-expression*

Defines a BGP-related access list.

- *list*—Access list number.

- **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*—Network number.

Example
```
ip default-network 128.99.0.0
```

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

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

- *IP-address*—Network address; specify target network address first, then neighbor network address.

- *mask*—Network mask.

- *interface*—Interface name.

- *distance*—Administrative distance.

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

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

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

- *protocol*—Protocol-type keyword: **rip, egp, hello, bgp, igp,** or **igrp**.

- *autonomous-system*—For IGRP, BGP, OSPF, or EGP protocols only: the number of an autonomous system.

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.

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

Example
```
router ospf 109
```

5.16 IP Routing Protocols Interface Subcommands

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

Enables or disables GDP routing with all default parameters.

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

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

- *seconds*—Holdtime in seconds.

Example
```
ip gdp holdtime 20
```

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

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

- *number*—Priority number.

Example
```
ip gdp priority 95
```

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

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

- seconds—Report time.

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 as follows:

Function	Default Value
router preference	100 (range 0-255)
maximum interval between advertisements	600 seconds
minimum interval between advertisements	{item}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.

- *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 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** *8-bytes-of-password*

Assigns or cancels a password to be used by neighboring routers on a wire that employs OSPF's simple password authentication.

- 8-bytes-of-password—Password you enter from the keyboard for authentication. It can be up to eight bytes in length.

Example
```
ip ospf authentication-key yourpassword
```

[**no**] **ip ospf cost** *cost*

Specifies or removes the cost of sending a packet on an interface.

- cost—Link state metric advertised as the link cost in the router's router links advertisement. The software does not support Type of Service (TOS), so you can assign only one cost per interface.
  In general, the path cost is calculated as follows:

$$10 \text{ to the eighth}/\text{Bandwidth}$$

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
Ethernet	10

[**no**] **ip ospf dead-interval** *number-of-seconds*

Sets or cancels the number of seconds that neighboring routers wait after seeing this router's Hello packets before declaring the router down. This value is advertised in the router's Hello packets in the DeadInt field and must be the same for all routers attached to a common network. Default is four times the Hello interval.

- *number-of-second*—Unsigned integer value. [list-element]...

Example
```
is ospf dead-interval 60
```

[**no**] **ip ospf hello-interval** *number-of-seconds*

Sets or cancels the number of seconds between the Hello packets that the router sends on the interface. This value is advertised in the router's Hello packets and must be the same for all routers attached to a common network.

- *number-of-second*—Unsigned integer value.

Example
```
is ospf hello-interval 15
```

[**no**] **ip ospf priority** *8-bit-number*

Establishes or cancels a Router Priority, which helps determine the Designated Router for a network. Default is zero.

- *8-bit-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 cancels the estimated number of seconds it takes to transmit a link state update packet on the interface. The value should include the trans- mission and propagation delays for the interface. Default is 1 second.

- *number-of-seconds*—Number of seconds; an integer.

Example
```
ip ospf transmit-delay 2
```

5.17 IP Routing Protocols Router Subcommands

[**no**] **area** *area-id* **authentication**

Enables authentication for an area; for OSPF only. The authentication type (AuType0 or AuType1) must be the same for all routers in an area.

- *area-id*—The Area ID of the area for which authentication is to be enabled.

Example
```
area 12 authentication
```

[**no**] **area** *area-id* **stub**
[**no**] **area** *area-id* **default-cost** *cost*

The two commands define an area as a stub area; for OSPF only. This command is used only on an area border router attached to a stub.

- *area-id*—The Area ID for the stub area specified as either a decimal value or an IP address.

- *cost*—Cost for the default external route used for the stub area expressed as a 32-bit number.

Example
```
area 12 stub
area 12 default-cost 1001
```

[**no**] **area** *area-id* **range** *IP-address mask*

Advertises a single summary route to other areas; for OSPF only. This command is used only with area border routers.

- *area-ID*—Area ID for the area about which routes are to be summarized specified as either a decimal value or an IP address.

- *IP-address*—-Standard IP address.

- *mask*—Standard IP mask.

Example
```
area 9 range 131.120.18.0 255.255.0.0
```

[**no**] **area** *area-id* **virtual-link** *router-id* [**hello-interval** *number-of-seconds*] [**retransmit-interval** *number-of-seconds*] [**transmit-delay** *number-of-seconds*] [**dead-interval** *number-of-seconds*] [**authentication-key** *8-bytes-of-password*]

Defines virtual links; for OSPF only.

- *area-id*—Area ID assigned to the transit area for the virtual link.

- *router-id*—Router ID associated with the virtual link neighbor.

- *number-of-seconds*—Number of seconds between the Hello packets that the router sends on the interface expressed as an unsigned integer. This value must be the same for all routers attached to a common network. Default is 10 seconds.

- *8-bytes-of-password*—String of characters that you can enter from the keyboard up to eight bytes in length.

[**no**] **default-information allowed** {**in** | **out**}

Controls the handling of default information between multiple IGRP processes. Default is enabled.

- **in** or **out**—Use the **in** keyword with the **no** form to suppress IGRP exterior or default routes when received by an IGRP process. Use the **out** keyword with the **no** form to suppress IGRP exterior routes in updates.

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 metric** *metric-value* **metric-type** *type-value*

Enables or disables the generation of a default route into an OSPF domain. Must be used with a redistribute command.

- **metric** *metric-value*—Specifies the link state cost to be assigned to the default route. The argument metric-value is a dimensionless link state cost formed as a 24-bit decimal.

- **metric-type** *type-value*—Specifies the external link type associated with the default route advertised into the OSPF routing domain. The type-value argument can be 1 (Type 1 external route) or 2 (Type 2 external route). Default is 2.

Example
```
default-information originate metric 100
  metric-type 1
```

default-metric *bandwidth delay reliability loading mtu*

Sets metrics for IGRP only.

- *bandwidth*—Minimum bandwidth of the route in kilobits per second.

- *delay*—Route delay in tens of microseconds.

- *reliability*—Likelihood of successful packet transmission expressed as a number between 0 and 255 where 255 is 100 percent reliability.

- *loading*—Effective bandwidth of the route in kilobits per second.

- *mtu*—Minimum Maximum Transmission Unit (MTU) of the route.

Example
```
default-metric 10000 2000 254 1 1500
```

---

default-metric *number*

Sets metrics for RIP, EGP, BGP, and HELLO, which use scalar, single-valued metrics.

- *number*—Default metric value appropriate for the specified routing protocol expressed as an unsigned integer.

Example
```
default-metric 10000
```

---

no default-metric

Instructs the current routing protocol to resume using the built-in automatic metric translations.

[**no**] **distance** *weight* [[*IP-source-address IP-address-mask*] [access-list-number)]]

Defines or deletes an administrative distance.

- *weight*—Integer from 10 to 255 that specifies a default administrative distance that the router uses when no other specification exists for a routing information source.
- *IP-source-address*—Internet address that identifies a router, network, or subnet to which the weight value applies.
- *IP-address-mask*—A mask that specifies which bits, if any, to ignore in the address value in dotted-decimal format.
- *access-list-number*—Number of a standard IP access list.

Example
```
distance 90 192.31.7.0 0.0.0.255
```

[**no**] **distance bgp** *external-distance internal-distance local-distance*

Specifies administrative distance.

- *external-distance*—Value for BGP external routes. Default is 20.
- *internal-distance*—Value for BGP internal routes. Default is 200.
- *local-distance*—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.

- *access-list-number*—Standard IP access list number.

- *interface-name*—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*]

Suppresses networks so that they are not sent in updates.

- access-list-number—Standard IP access list number.

- interface-name or routing-process—To restrict the routing updates sent to a specific interface, specify the interface. To redistribute networks, specify the routing process name.

Example
```
distribute-list 3 out igrp 109
```

[**no**] **metric holddown**

For IGRP only. Disables or re-enables holddown. Use this command only if the entire autonomous system (AS) is running Version 8.2(5) or later.

[**no**] **metric maximum-hops** *hops*

For IGRP only. Causes the IP routing software to advertise as unreachable those routes with a hop count greater than the assigned value.

- *hops*—Hop count from 1 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).

- *TOS*—Use the parameter 0.

- *K1-K5*—Constants for the equation that converts an IGRP metric vector into a scalar quantity. By default, K1 = 1, K2 = 0, K3 = 1, K4 = 0, and K5 = 0.

[**no**] **neighbor any** [*list*]

Controls how an BGP process determines which neighbors will be treated as peers.

- *list*—Access list number.

[**no**] **neighbor any** [*list*]
[**no**] **neighbor any third-party** *IP-address* [**internal** | **external**]

Controls how an EGP process determines which routers to treat as peers. Used with the router egp 0 router subcommand.

- *list*—Access list number. When this argument is supplied, the neighbor is accepted by the access list to be allowed to peer with the EGP process.
- **third-party** *IP-address*—Provides the IP address to be used as the next hop in EGP advertisements.
- **internal** or **external**—Indicates whether the third-party router should be listed in the internal or external section of the EGP update.

Examples
```
neighbor any 2
neighbor any third-party 10.1.1.1
```

[**no**] **neighbor** *IP-address*

Creates a list of neighbor routers. The no form removes the entry.

- *IP-address*—IP address of a peer router with which routing information will be exchanged.

Example
```
neighbor 192.31.7.0
```

[**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* **filter-as** *number* **deny**

Filters neighbor information for an address in a specific autonomous system (AS) for BGP. Instructs the router to ignore the information learned about the network.

- *IP-address*—IP address of the neighbor router.

- *number*—Autonomous system number of the neighbor routers that you want to filter.

Example
```
neighbor 120.23.4.1 filter-as 20 deny
```

[**no**] **neighbor** *IP-address* **filter-as** *number* **permit** *weight*

Filters neighbor information for an address in a specific autonomous system (AS) for BGP. Allows incoming information to be added to the routing table.

- *IP-address*—IP address of the neighbor router.

- *number*—Autonomous system number of the neighbor routers that you want to filter.

- *weight*—Weight associated with incoming information that is added to the routing table.

Example
```
neighbor 120.23.4.1 filter-as 20 permit 60
```

[**no**] **neighbor** *IP-address* **filter-list** *list* {**in** | **out**}
[**no**] **neighbor** *IP-address* **filter-list** *list* **weight** *weight*

Establishes or removes filters. You can specify multiple weight filters for a single neighbor, but only one in or out filter.

- *IP-address*—IP address of the neighbor router.

- *list*—Predefined BGP access list number.

- **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**.

- **weight** *weight*—Assigns a relative importance to a specific list.

Examples
```
neighbor 192.31.7.0 filter-list 41 out
neighbor 120.23.4.1 filter-list weight 10
```

[**no**] **neighbor** *IP-address* **interface** *interface* [**priority** *8-bit-number*] [**poll-interval** *number-of-seconds*]

Configures routers interconnecting to non-broadcast networks; for OSPF only. The no form removes the neighbor with the specified IP address from the list.

- *IP-address*—Neighbor's IP address.

- **interface** *interface*—Specifies interface type and unit number.

- **priority** *8-bit-number*—Router Priority value of the the nonbroadcast neighbor associated with the specified IP address.

- **poll-interval** *number-of-seconds*—Specifies the interval at which hello packets are sent to a neighboring router that has become inactive. This interval should be much larger then the Hello Interval. Default is 120 seconds.

Example
```
neighbor 120.23.4.77 interface ethernet 2
```

[**no**] **neighbor** *IP-address* **remote-as** *autonomous-system*

Adds a neighbor entry to the routing table for BGP.

- *IP-address*—IP address of the neighbor router.

- *autonomous-system*—Autonomous system number of the neighbor router.

Example
```
neighbor 131.108.1.2 remote-as 109
```

[**no**] **neighbor** *IP-address* **third-party** *third-party-IP-address*
[**internal** | **external**]

Adds third-party information to EGP routing updates.

- *IP-address*—IP address of the EGP peer.

- *third-party-IP-address*—Address of the third party on the network shared by the router and the EGP peer.

- **internal** or **external**—Indicates whether the third-party router should be listed in the internal or external section of the EGP update.

Example
```
neighbor 131.108.6.5 third-party 131.108.6.99
internal
```

[**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.

- *IP-address*—Address of the BGP-speaking neighbor

- *value*—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.

- *IP-address*—Specific neighbor connection to which you want to assign the weight.

- *weight*—Weight to assign.

Example
```
neighbor 131.99.87.2 weight 50
```

[**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, HELLO, 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 backdoor route.

Example
```
network 192.31.7.0 backdoor
```

[**no**] **offset-list** *list* {**in** | **out**} *offset*

For IGRP, RIP, and HELLO only. Adds or removes a positive offset to incoming and outgoing metrics for networks matching an access list.

- *list*—Access list. Specify zero to apply the offset to all metrics.

- **in** or **out**—Indicate whether the offset applies to incoming (**in**) or outgoing (**out**) metrics.

- *offset*—Offset. For IGRP, the offset is added to the delay component only.

Example
```
offset-list 121 out 110
```

[**no**] **passive-interface** *interface*

Disables or enables the routing of updates on an interface.

- *interface*—Interface name.

Example
```
passive-interface fddi 1
```

[**no**] **redistribute** *process-name* [*AS-number*]

Passes routing information among routing protocols.

- *process-name*—Routing information source: **static, rip, egp, hello,** or **igrp**.

- *AS-number*—If you specified **igrp, bgp,** or **egp**, supply the autonomous system number.

Example
```
redistribute egp 4
redistribute static
```

[**no**] **redistribute** *protocol* [*source-id*] [**metric** *metric-value*] **metric-type** *type-value*] **tag** *tag-value*] [**subnets**]

Redistributes routes from other OSPF routing domains and non-OSPF routing domains into a specific OSPF routing domain.

- *protocol*—Source protocol from which routes are being distributed: **bgp, egp, hello, igrp, ospf, rip,** or **static**.

- *source-id*—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 hello or rip.

- **metric** *metric-value*—Specifies the link state cost to be assigned to the default route. The argument *metric-value* is a dimensionless link state cost formed as a 24-bit decimal.

- **metric-type** *type-value*—Specifies the external link type associated with the default route advertised into the OSPF routing domain. The *type-value* argument can be 1 (Type 1 external route) or 2 (Type 2 external route). Default is 2.

- **tag** *tag-value*—32-bit decimal value attached to each external route.

- **subnets**—Specifies the scope of redistribution for the specified protocol.

Example

```
redistribute hello metric 100 metric-type 1
```

[**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 ASes. 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.

- *update*—Rate at which updates are sent.

- *invalid*—Number of seconds after which a route is declared invalid. The value of *invalid* should be three times the value of *update*.

- *holddown*—Number of seconds during which routing information regarding better paths is suppressed. The value of *holddown* should be at least three times the value of *update*.

- *flush*—Number of seconds that must pass before the route is removed from the routing table. The value of *flush* should be equal to or greater than the sum of the values of *invalid* and *holddown*.

- *sleeptime*—Number of milliseconds to postpone routing updates.

Example

```
timers basic 5 15 15 30 100
```

[**no**] **timers bgp** *keepalive holdtime*

Adjusts BGP timers. The no form restores the default.

- *keepalive*—Frequency with which the router sends keepalive messages to its peer. Default is 60 seconds.

- *holdtime*—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
```

[**no**] **timers egp** *hello poll*

Adjusts EGP timers. The no form restores the default.

- *hello*—Interval at which hello packets are sent. Default is 60 seconds.

- *poll*—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
```

5.18 IP and SLIP Show Commands

Command	Display
show access-lists	Contents of IP access lists.
show hosts	Default domain name, style of name lookup service, list of name server hosts, and cached list of host names and addresses.
show ip accounting [**checkpoint**]	Active IP accounting database.
show ip aliases	Internet addresses mapped to TCP ports.
show ip arp	Address Resolution Protocol (ARP) cache.
show ip bgp [*network*]	Networks in the BGP routing table.
show ip bgp neighbors [*network*] **routes**	Routes learned from the specified neighbor.
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 [*interface*]	IP parameters configured on the interface.

Command	Display
show ip irdp	IRDP values.
show ip masks [*address*]	Masks used for network addresses.
show ip ospf [*options*]	OSPF routing processes.
show ip ospf interface [*interface*]	OSPF parameters configured on the interface.
show ip ospf neighbor [*interface*]	OSPF neighbor information on a per-interface basis.
show ip protocols	Parameters and current state of the active routing protocol process.
show ip route [*options*]	IP routing table.
show ip tcp header-compression	IP compression statistics.
show ip traffic	IP protocol statistics.
show tcp [*line-number*]	Status of TCP connections.

5.19 ISO CLNS Global Configuration Commands

[**no**] **clns configuration-time** *seconds*

Specifies the rate at which ESH and ISH packets are sent. The no form restores the default of 60.

• *seconds*—Number of seconds.

Example
```
clns configuration-time 45
```

[**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*

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.

Example
```
clns net 47.0005.0001.0000.0001.000.00
```

[**no**] **clns packet-lifetime** *number*

Specifies the initial lifetime for locally generated packets. Default is 64.

- *number*—Number of seconds.

Example
```
clns packet-lifetime 32
```

[**no**] **clns routing**

Enables or disables routing of CLNS packets.

[**no**] **clns want-erpdu**

Specifies whether the router requests error PDUs on packets sourced by the router. Default is enabled.

5.20 ISO CLNS Interface Subcommands

[**no**] **clns checksum**

Enables or disables checksum generation when ISO CLNS routing soft-ware 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 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* [*X.25-facilities-info*]

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.
- *X.25-facilities-info*—Specifies nondefault packet and window size, reverse charge information, and so on.

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 mtu** *size*

Sets the MTU packet size for the interface. The **no** form restores the default, which is the maximum packet size for the interface.

- *size*—MTU packet size 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 rpdu-interval 50
```

[**no**] **clns rdpdu-mask**

Enables or disables the address mask on RDPDUs.

[**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.

6

ISO CLNS Routing Protocols

6.1 Global Configuration Commands

[**no**] **clns route** *NSAP-prefix interface-type unit* [*SNPA-address*]

Creates a static route for a specific interface. The **no** form with the NSAP-prefix argument cancels the static route.

- *NSAP-prefix*—Prefix of NSAPs to be forwarded.

- *interface-type*—Interface type.

- *unit*—Interface number.

- *SNPA-address*—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 0 0000.0c00.1550
clns route 39.0003 serial  1  4085551212
```

[**no**] **clns route** *NSAP-prefix* {*next-hop-NET* | *name*}

Establishes a specific static route.

- *NSAP-prefix*—Prefix of NSAPs to be forwarded.

- *next-hop-NET*—NET where forwarded NSAPs are sent.

- *name*—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** *NSAP-prefix* **discard**

Tells a router to discard packets with the specified NSAP-prefix.

- *NSAP-prefix*—Prefix of NSAPs to be forwarded.

Example
```
clns  route 47.0004.000c discard
```

[**no**] **router** [**isis** | **iso-igrp**] *area-tag*

Identifies the area the router will work in and lets the router know that it will be routing dynamically rather than statically.

- **isis** and **iso-igrp**—The keyword **isis** specifies the IS-IS protocol. The keyword **iso-igrp** specifies the ISO-IGRP protocol.

- *area-tag*—Meaningful name for an area.

Example
```
router isis area1
```

6.2 ISO CLNS Routing Protocols Router Subcommands

[**no**] **distance** *value*

Assigns or deletes an administrative distance for a particular routing protocol. The **no** form restores the following defaults: static routes = 10, ISO-IGRP routes = 100, IS-IS routes = 110.

[**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** | **level-1-2** | **level-2-only**—If **level-1** is specified, the router acts as an station router. If **level-1-2** is specified, the router acts as both an station router and a router that routes between areas. If **level-2-only** is specified, the router acts as an interarea router only.

Example
```
is-type level-1
```

[**no**] **net** *NET*

Configures a Network Entity Title (NET) for the routing process.

- *NET*—Network Entity Title, which defines the area addresses for the ISO-IGRP area.

Example
```
net 47.0004.004d.0001.0000.0c11.1111.00
```

[**no**] **redistribute** [**iso-igrp** | **isis**] *area-tag*

Redistributes routing information throughout a routing area. The no form disables this CLNS routing protocol on this interface.

- *area-tag*—Defined tag for the areas from which the routing information is to be redistributed.

Example
```
redistribute iso-igrp area2
```

[**no**] **redistribute static**

Causes the router to inject any static CLNS routes into the domain. The no form stops redistribution.

6.3 ISO CLNS Routing Protocols Interface Subcommands

[**no**] **clns route** *NSAP-prefix interface-type unit* [*SNPA-address* | *X.121-address*]

Establishes a specific static route for a named interface.

- *nsap-prefix*—Prefix of NSAPs to be forwarded.

- *interface-type unit*—Name and number of interface.

- *SNPA address* or *X.121 address*—Either the SNPA address, which is required for multiaccess networks other than serial interface routes, or the X. 121 address.

Examples
```
clns route 39.0001 serial 0
clns route 38.0002 ethernet 0 10000.0c00.1550
```

[**no**] **clns router isis** *area-tag*

Enables IS-IS routing for OSI on a specific interface. The no form with an area tag disables IS-IS routing for the system.

- *area-tag*—Tag defined for the NET using the ROUTER global configuration command.

- *level2*—Specifies that the interface can advertise Level 2 information.

Example
```
clns router isis area1
```

[**no**] **clns router iso-igrp** *area-tag* [**level2**]

Specifies ISO-IGRP routing. The **no** form with an area tag disables ISO IGRP routing for the system.

- *area-tag*—Tag defined for the NET using the ROUTER global configuration command.
- **level2**—Specifies that the interface can advertise Level 2 information.

Example
```
clns router iso-igrp area3 level2
```

[**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 if and only if the neighbor is configured exclusively to be a Level 2 router.

[**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
```

6.4 ISO CLNS Show Commands

Command	Display
show clns cache	CLNS routing cache.
show clns	Information about the CLNS network.
show clns es-neighbor [*options*]	ES neighbors that this router knows about.
show clns interface [*interface*]	CLNS parameters configured on this interface.
show clns is-neighbors [*options*]	IS neighbors sorted according to the area in which they are located.
show clns neighbors [*options*]	Information about both ES and IS neighbors.
show clns protocol	Protocol-specific information about each ISO-IGRP routing process in this router.
show clns redirects	CLNS redirect information.
show clns route [*NSAP*]	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**]	IS-IS link state database.
show isis routes	IS-IS Level 1 routing table.

6.5 Novell Global Commands

[**no**] **access-list** *number* {**deny** | **permit**} *novell-source-network*[*.source-address* [*source-mask*]] *novell-destination-network* [*.destination-address* [*destination-mask*]]

Specifies standard Novell IPX access lists. The **no** form removes any access list in the current image with the specified number.

- *number*—A unique number for this access list from 800 to 899.
- **deny** or **permit**—Specifies the deny or permit condition.
- *novell-source-network*—Source network.
- *.source-address*—Address of the source network.
- *source-mask*—Mask for the *source-address*.
- *novell-destination-network*—Destination network.
- *.destination-address*—Address of the destination network.
- *destination-mask*—Mask for the *destination-address*.

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** *number* {**deny** | **permit**} *novell-protocol source-network* [*.source-address* [*source-mask*]] *source-socket destination-network* [*.destination-address* [*destination-mask*]]*destination-socket*

Specifies extended Novell IPX access lists. The **no** form removes any access list in the current image with the specified number.

- *number*—A unique number for this extended access list from 900 to 999.
- **deny** or **permit**—Specifies the deny or permit condition.
- *novell-protocol*—Novell protocol number.
- *source-network*—Source network.
- *.source-address*—Address of the source network. A network number of 1 matches all networks.
- *source-mask*—Mask for the *source-address*.
- *source-socket*—Socket number. A socket number of zero matches all sockets.
- *destination-network*—Destination network.
- *.destination-address*—Address of the destination network.
- *destination-mask*—Mask for the *destination-address*.

- *destination-socket*—Destination socket number. A socket number of zero matches all sockets.

Examples

```
access list 900 deny 1 1 1234 2 1234
access list 900 deny 1 1.1111.1111.1111 0000.0000.
0000 1234 2.2222.2222.2222 0000.0000.0000 1234
```

[**no**] **access-list** *number* {**permit** | **deny**} *network* [.*address*] [*service-type*]

Defines an access list for filtering SAP-based messages generated by Novell servers and DECbrouter 90 routers as they broadcast their capabilities.

- *number*—A unique decimal number from 1000 to 1099.

- **permit** or **deny**—Specifies the type of access desired. Permit or deny access is based on the data provided.

- *network*—A hexadecimal Novell network number. The value zero defines the local network; the value 1 defines all networks.

- *.address*—Novell host address.

- *service-type*—The service type to filter in hexadecimal format. The value zero represents all services.

Example

```
access-list 1001 deny -1 4
access-list 1001 permit -1
```

[**no**] **novell maximum-paths** *paths*

Follows the NOVELL ROUTING command to set the maximum number of multiple paths that the router will remember and use. The no form restores the default, which is 1.

- *paths*—Number of paths to be remembered.

Example
```
novell maximum-paths 3
```

[**no**] **novell route** *network network.address*

Specifies or removes static routes for a Novell network.

- *network*—The network whose messages you want to forward.

- *network.address*—The network address of the router to which you want to forward network traffic.

Example
```
novell route 5e 3abc.0000.0c00.1ac9
```

[**no**] **novell routing** [*host-address*]

Enables or disables Novell routing and Novell RIP routing and SAP services.

- *host-address*—System-wide host address. If you do not specify an address, the MAC address of the first Ethernet, Token Ring, or FDDI interface is used. The address must not be multicast.

Example
```
novell routing 0000.0c00.23fe
```

[**no**] **novell sap** *service-type name net.address socket hop-count*

Specifies or removes static Novell SAP table entries.

- *service-type*—SAP service-type number.

- *name*—Service name.

- *net.address*—Network and host address of the server.

- *socket*—Socket number for this service

- *hop-count*—Server is this number of hops away.

Example
```
novell sap 107 MAILSERV 160.0000.0c01.2b72 8104 1
```

6.6 Novell Interface Subcommands

[**no**] **novell access-group** *number*

Assigns a Novell IPX access list group number to a specific interface. The **no** form removes the number.

- *number*—Novell access list number. All outgoing packets forwarded through the interface will be filtered by this access list.

Example
```
novell access-group 815
```

novell encapsulation {**novell-ether** | **arpa**}

Selects which data format or encapsulation is used on an Ethernet interface. Default is Novell IPX over Ethernet using Novell's variant of IEEE 802.2 encapsulation.

Choose one of these keywords:

- **novell-ether**—Enter to specify Novell IPX over Ethernet using Novell's variant of IEEE 802.2 encapsulation.

- **arpa**—Enter when the Novell systems must communicate with other vendors' systems such as Digital VAX/VMS. In this case, Ethernet-style encapsulation is used with a protocol type of 8137.

Example
```
novell encapsulation arpa
```

[**no**] **novell helper-address** *net.host*

Forwards broadcast packets that match the access list specified by the NOVELL HELPER-LIST subcommand. Useful for hosts that use a protocol other than SAP to advertise their availability.

- *net.host*—The network and host address to which broadcast packets are forwarded.

Example
```
novell helper-address 3abc.0000.0c00.1ac9
```

[**no**] **novell helper-list** *access-list-number*

Forwards packets that pass the specified Novell access list to the Novell helper host. The **no** form disables the function.

- *access-list-number*—The access list number specified in the Novell ACCESS-LIST command.

Example
```
novell helper-list 801
```

[**no**] **novell input-network-filter** *access-list-number*

Interface subcommand that explicitly specifies the networks that are added to the Novell IPX routing table. The **no** form disables the function.

- *access-list-number*—The access list number specified in the NOVELL ACCESS-LIST command.

Example
```
novell input-network-filter 801
```

[**no**] **novell input-sap-filter** *access-list-number*

Explicitly specifies the services that are added to the Novell SAP table. The **no** form disables this function.

- *access-list-number*—A SAP access list number from 1000 to 1099.

Example
```
novell input-sap-filter 1000
```

[**no**] **novell network** *number*

Enables and disables Novell routing on a particular interface.

- *number*—Number of the Novell network to which the interface is attached.

Example
```
novell network 5e
```

[**no**] **novell output-network-filter** *access-list-number*

Explicitly specifies the list of networks that are sent in routing updates. The **no** form disables the function.

- *access-list-number*—The access list number specified in the novell ACCESS-LIST command.

Example
```
novell output-network-filter 821
```

[**no**] **novell output-sap-delay** *delay*

Establishes a delay between SAP packets so that the router interface operates at the slower speed of the Novell server. The **no** form disables the mechanism.

- *delay*—The delay between SAP packets in milliseconds.

Example
```
novell output-sap-delay 200
```

[**no**] **novell output-sap-filter** *access-list-number*

Explicitly specifies the list of services that are included in a SAP update. The **no** form disables this function.

- *access-list-number*—A SAP access list number from 1000 to 1099.

Example
```
novell input-sap-filter 1000
```

[**no**] **novell route-cache**

Enables or disables Novell fast switching. Default is enabled.

[**no**] **novell router-filter** *access-list-number*

Interface subcommand that specifies or removes the list of routers from which data will be accepted.

- *access-list-number*—Access list number specified in the NOVELL ACCESS-LIST command.

Example
```
novell router-filter 823
```

[**no**] **novell router-sap-filter** *access-list-number*

Configures the routers to filter Novell SAP messages. The **no** form removes the filters.

- *access-list-number*—A SAP Novell access list from 1000 to 1099.
  Defines the specific router from which SAP updates will be accepted or denied.

Example
```
novell router-sap-filter 1000
```

---

novell sap-interval *interval*

Establishes less frequent SAP update interval for use over slow links. Default is 1 minute.

- *interval*—Number of minutes between SAP updates. If *interval* is 0, periodic updates are not sent. A message is sent only when the server first appears and when it goes down.

Example
```
novell sap-interval 5
```

[**no**] **novell source-network-update**

When enabled, repairs corrupted network numbers by setting the source network field of any packet with a hop count of zero to the local network number.

[**no**] **novell update-time** *seconds*

Allows the Novell routing update timers to be set individually for each interface. This command can be used only with all DECbrouter 90 or a combination of Cisco routers and DECbrouter 90s environment, and all timers should be the same for routers connected to the same network segment. The **no** form restores the default of 60 seconds.

- *seconds*—The interval between updates. Minimum is 10.

Example
```
novell update-time 40
```

6.7 Novell Show Commands

Command	Display
show novell cache	List of fast-switching cache entries.
show novell interface [*interface*]	Novell parameters configured on the interface.
show novell route	Novell routing table.
show novell servers	Servers discovered through SAP advertisements.
show novell traffic	Information about Novell packets transmitted and received including number and type.

6.8 PUP Commands

[**no**] **pup routing**

Enables or disables PUP routing.

[**no**] **pup** *address*

Enables or disables PUP routing on a particular interface.

• *address*—The desired PUP address of the interface.

Example
```
pup 10#371
```

[**no**] **pup helper-address** *address*

Sets the helper address so that broadcasts to the PUP Miscellaneous Services socket can be forwarded to another network (the helper address) where the appropriate servers can be found.

• *address*—The PUP address of the desired server.

Example
```
pup helper-address 10#371
```

6.9 PUP Show Commands

Command	Display
show pup arp	PUP-specific ARP entries.
show pup route	Routing entries obtained from the PUP routing protocol.
show pup traffic	Statistical summaries of PUP packets.

6.10 VINES Global Configuration Commands

[**no**] **vines access-list** *number* {**permit** | **deny**} **IP** *source-address source-mask dest-address dest-mask*
[**no**] **vines access-list** *number* {**permit** | **deny**} *protocol source-address source-mask source-port dest-address dest-mask dest-port*

Commands create or delete a VINES access list.

- *number*—Access list number from 1 to 100.

- **permit** or **deny**—Specifies the permit or deny condition.

- *protocol*—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

- *source-address* and *dest-address*—VINES addresses written in the standard form.

- *source-mask* and *dest-mask*—VINES addresses that indicate the bits in the corresponding address that should be ignored.

- *source-port* and *dest-port*—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
no vines access-list 1
```

[**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.

• *name*—The name of a VINES host. It can be any length.

• *address*—The VINES address expressed in the form *network:subnet*.

Example
```
vines host STUFF 0027AF92:8001
```

[**no**] **vines routing** [*address*]

Enables or disables VINES routing.

• *address*—Specifies the VINES address of the router. The format is *network:subnet*. The *subnet* must always be 1. The *address* argument is not necessary for Ethernet interfaces, because the router automatically maps itself into the VINES address space that is reserved for the router.

Example
```
vines routing 3001082D:1
```

6.11 VINES Interface Subcommands

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

Assigns an outgoing VINES access list to the defined interface. The **no** form removes the access list.

• *list*—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.

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, and **snap** for IEEE 802.2 media.

[**no**] **vines metric** [*number*]

Enables or disables the processing of VINES processing on this interface.

- *number*—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 delay value set for the defined interface.

[**no**] **vines redirect-interval** [*number*]

Determines how frequently the router sends an ICP redirect message on a given interface.

- *number*—The minimum number of seconds that must pass before the router sends *redirect* messages. If the value for *number* is 0, the router will never send redirects on this interface.

Example
```
vines redirect-interval 0
```

[**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.

6.12 VINES Show Commands

Command	Display
show vines host [*name*]	Contents of the VINES name table.
show vines interface [*interface*]	VINES parameters configured on the interface.
show vines neighbors [*address*]	Contents of the VINES neighbor table maintained by this router.
show vines route [*address*]	Contents of the VINES routing table.
show vines traffic	Statistics kept about VINES protocol traffic.

6.13 XNS Global Configuration Commands

[**no**] **access-list** *number* {**permit** | **deny**} *XNS-source-network* [*.source-address* [*source-mask*]] *XNS-destination-network* [*.destination-address*[*destination-mask*]]

Configures or removes an XNS access list.

- *number*—Access list number in the range from 400 to 499.

- **permit** or **deny**—Specifies the filtering action.

- *XNS-source-network*—The XNS source network.

- *.source-address*—Address of the *XNS-source-network*.

- *source-mask*—Mask for the *source-address*.

- *XNS-destination-network*—The XNS destination network.

- *.destination-address*—Address of the *XNS-destination-network*.

- *destination-mask*—Mask for the *destination-address*.

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** *number* {**deny** | **permit**} *XNS-protocol source-network*[*.source-address* [*source-mask*]] *source-socket destination-network*[*.destination-address* [*destination-mask*]] *destination-socket*

Configures or removes an extended XNS access list.

- *number*—Access list number in the range from 500 to 599.

- **permit** or **deny**—Specifies the filtering action.

- *XNS-protocol*—XNS protocol number.

- *source-network*—The XNS source network.

- *.source-address*—Address of the *XNS-source-network*.

- *source-mask*—Mask for the *source-address*.

- *destination-network*—The XNS destination network.

- *.destination-address*—Address of the *XNS-destination-network*.

- *destination-mask*—Mask for the *destination-address*.

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 *number*

Removes the specified XNS access list.

- *number*—Access list number.

Example
```
no access-list 401
```

[**no**] **xns forward-protocol** *type*

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.

- *type*—A decimal number corresponding to an appropriate XNS protocol.

Example
```
xns forward-protocol 2
```

[**no**] **xns maximum-paths** *paths*

Sets the maximum number of equal-cost paths the router will use. Default is 1.

- *paths*—Maximum number of paths.

Example
```
xns maximum-paths 2
```

[**no**] **xns route** *network host-address*

Adds a static route to the XNS routing table.

- *network*—The destination XNS network number expressed in decimal format.
- *host-address*—A decimal XNS network number and the hexadecimal host number.

Example
```
xns route 25 51.0456.acd3.1243
```

[**no**] **xns routing** [*address*]

Enables XNS routing. The **no** form disables all XNS packet processing.

- *address*—XNS address the router should use. If the argument address is omitted, the router uses the first 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.

6.14 XNS Interface Subcommands

[**no**] **xns access-group** *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.

- *number*—Access list number.

Example

```
xns access-group 500
```

[**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*]

Configures the router to receive RIP updates on some interfaces as if they were Ungermann-Bass updates.

- *access-list*—XNS access list. Include this argument when you only want certain routes to be learned through standard RIP.

[**no**] **xns helper-address** *host-address*

Sets a helper address to forward broadcasts. The **no** form disables XNS helpering.

- *host-address*—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
```

xns update-time *seconds*

Sets the XNS routing update timers. Use this command only in an environment that is all DECbrouter 90 or a mixture of DECbrouter 90 and Cisco routers. Make sure that all timers are the same for routers attached to the same network segment. Default is 30 seconds.

- *seconds*—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
```

6.15 XNS Show Commands

Command	Display
show xns cache	List of fast-switching cache.
show xns interface [*interface*]	XNS parameters configured on the interface
show xns route [*network*]	XNS routing table.
show xns traffic	Packet statistics including packets sent, received, and forwarded.

7

Bridging Configuration

7.1 Transparent Bridging Global Configuration Commands

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

Prepares access control information for filtering of frames by canonical (Ethernet ordered) MAC address. The **no** form removes a single access list entry.

- *list*—An integer from 700 to 799 selected for the list.
- **permit** or **deny**—Indicates whether the frame is permitted or denied.
- *address*—48-bit canonical MAC address written in dotted triplet form.
- *mask*—48-bit canonical MAC address written in dotted triplet form. The ones bits in the mask argument are the *address* bits to be ignored. [list-element]...

Examples
```
access-list 700 deny 0800.2000.0000 0000.00FF.
  FFFF
access-list 700 permit 0000.0000.0000 FFFF.FFFF.
  FFFF
```

[**no**] **access-list** *list* {**permit** | **deny**} *type-code wild-mask*

Prepares access control information for filtering frames by protocol type. The **no** form removes a single access list entry.

- *list*—Unique number from 200 to 299 that identifies the list.
- **permit** or **deny**—Indicates whether the frame is permitted or denied.
- *type-code*—16-bit hexadecimal number with a leading "0x."
- *wild-mask*—16-bit hexadecimal number whose ones bits correspond to bits in the *type-code* argument that the router should ignore when making a comparison.

Examples
```
access-list 201 permit 0x6005 0x0000
access-list 201 deny 0x0000 0xFFFF
```

[**no**] **access-list** *list* {**permit** | **deny**} *source-addr source-mask dest dest-mask offset-into-packet size:1-4 operation operand*

Defines an extended access list for finer control of bridged traffic.

- *list*—An integer from 1100 through 1199.

- **permit** or **deny**—Indicates whether the frame is permitted or denied.

- *source-addr*—MAC Ethernet address in the form xxxx.xxxx.xxxx.

- *source-mask*—Mask of MAC Ethernet source address bits to be ignored.

- *dest*—MAC Ethernet values used for matching the destination address of a packet.

- *dest-mask*—Mask of MAC Ethernet destination address bits to be ignored.

- *offset-into-packet*—With the size argument, defines a range of values that must be satisfied in the access list. Specified in decimal or hexadecimal format in the form *0xnn*.

- *size*—An integer from 1 to 4.
  The argument *operator* 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.

- *group*—Spanning tree group number.

- *MAC-address*—48-bit dotted triplet canonical (Ethernet ordered) hardware address such as those displayed by the EXEC SHOW ARP command. The address can be a station address, the broadcast address, or a multicast destination address.

- **forward**—Enables the bridge to forward a frame sent from or destined for the specified address.

- **discard**—Instructs the bridge to discard frames sent from or destined for the specified address without further processing.

- *interface*—Specifies an interface on which the address can be reached.

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-DECbrouter 90 (except for Cisco bridges) bridges might not work correctly on networks containing DECbrouter 90 bridges' domain numbers other than zero.

- *group*—Bridge group number between 0 and 10 as specified by the BRIDGE *group* PROTOCOL IEEE command.

- *domain-number*—Unique domain number that you choose. The domain number 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.

- *group*—Spanning tree group number.

- *seconds*—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 1 second.

- *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 15 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. Minimum = 1, maximum = 65000, default = 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
```

7.2 Transparent Bridging Interface Subcommands

[**no**] **bridge-group** *group*

Assigns the network interface to the spanning tree group. The **no** form removes the network interface.

- *group*—Spanning tree group number.

Example
```
bridge-group 2
```

bridge-group *group* **circuit** *number*

Establishes load balancing, marking a serial interface as belonging to circuit group number. Parallel serial interfaces on both bridges all must be flagged as being members of the same circuit group.

- *group*—Spanning tree group number.

- *number*—Circuit group number expressed as an integer from 1 to 9.

Example
```
bridge-group 3 circuit 1
```

[**no**] **bridge-group** *group* **input-address-list** *list*

Assigns or removes an access list to or from a particular interface for filtering by the MAC source addresses.

- *group*—Spanning tree group number.

- *list*—Access list number between 200 and 299 assigned with the bridge ACCESS-LIST command.

Example
```
bridge-group 1 input-address-list 200
```

[**no**] **bridge-group** *group* **input-lat-service-deny** *grouplist*

Specifies the group codes with which to deny access upon input. Default is no filtering.

- *group*—Spanning tree group number.

- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

Example
```
bridge-group 1 input-lat-service-deny 1 5 12-14
```

[**no**] **bridge-group** *group* **input-lat-service-permit** *grouplist*

Specifies the group codes with which to permit access upon input. Default is no filtering.

- *group*—Spanning tree group number.

- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

Example
```
bridge-group 1 input-lat-service-permit 1 5 12-14
```

bridge-group *group* **input-lsap-list** *list*

Adds or removes a filter for IEEE 802-encapsulated packets on input. This access list is applied to all IEEE 802 frames received on that interface prior to the bridge-learning process.

- *group*—Spanning tree group number.

- *list*—Access list number between 200 and 299 assigned with the bridge ACCESS-LIST command.

Example
```
bridge-group 2 input-lsap-list 250
```

---

bridge-group *group* **input-type-list** *list*

Adds or removes a filter for Ethernet- and SNAP-encapsulated packets on input. The bridge applies the access list to all Ethernet frames received on that interface prior to the bridge learning process.

- *group*—Spanning tree group number.

- *list*—Access list number between 200 and 299 assigned with the bridge ACCESS-LIST command.

Example
```
bridge-group 4 input-type-list 200
```

[**no**] **bridge-group** *group* **lat-compression**

Reduces the amount of bandwidth that LAT traffic consumes on serial interfaces. LAT compression can be specified for serial compression only.

- *group*—Spanning tree group number.

Example
```
bridge-group 2 lat-compression
```

[**no**] **bridge-group** *group* **output-address-list** *list*

Assigns or removes an access list to or from a particular interface for filtering by the MAC destination addresses.

- *group*—Spanning tree group number.

- *list*—Access list number between 200 and 299 assigned with the bridge ACCESS-LIST command.

Example
```
bridge-group output-address-list 204
```

---

bridge-group *group* **output-lat-service-deny** *grouplist*

Specifies the group codes with which to deny access upon output. Default is no filtering.

- *group*—Spanning tree group number.
- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

Example
```
bridge-group 1 output-lat-service-deny 1 5 12-14
```

bridge-group *group* **output-lat-service-permit** *grouplist*

Specifies the group codes with which to permit access upon output. Default is no filtering.

- *group*—Spanning tree group number.
- *grouplist*—Specifies the LAT groups. Single numbers and ranges are permitted.

Example
```
bridge-group 1 output-lat-service-permit 1 5 12-14
```

bridge-group *group* **output-lsap-list** *list*

Adds or removes a filter for IEEE 802-encapsulated packets on output. This access list is applied just before sending out a frame to an interface.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 200 assigned with the bridge ACCESS-LIST command.

Example
```
bridge-group 3 output-lsap-list 223
```

bridge-group *group* **output-type-list** *list*

Adds or removes a filter for Ethernet- and SNAP-encapsulated packets on output. The bridge applies the access list just before sending out a frame to an interface.

- *group*—Spanning tree group number.
- *list*—Access list number between 200 and 299 assigned with the bridge ACCESS-LIST command.

Example
```
bridge-group 5 output-type-list 299
```

[**no**] **bridge-group** *group* **path-cost** *cost*

Sets or removes a different path cost. Default is 100.

- *group*—Spanning tree group number.

- *cost*—Integer from 0 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.

- *group*—Spanning tree group number.

- *number*—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
```

7.3 Transparent Bridging Show Commands

Command	Display
show bridge [*options*]	Classes of entries in the bridge-forwarding database.
show span	Current, known spanning-tree topology, including whether or not LAT group code filtering is in effect.

8

IBM Connectivity

8.1 LLC2 Interface Subcommands

llc2 ack-delay-time *milliseconds*

Controls the maximum amount of time that the router allows incoming I-frames to stay unacknowledged. Minimum = 1, maximum = 60000, default = 3200.

- *milliseconds*—Number of milliseconds that the router allows incoming I-frames to stay unacknowledged, even if it has not received the number of frames specified with the LLC2 ACK-MAX command.

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
```

8.2 LLC2 Show Command

Command	Display
show llc2	State of the LLC2 connections.

8.3 SDLC Interface Subcommands

[**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 *windowsize*

Controls the router's local send window size. Minimum = 1, maximum = 7, default = 7.

- *windowsize*—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** version 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
```

8.4 STUN Global Configuration Commands

[**no**] **stun peer-name** *IP-address*

Enables or disables STUN.

- *IP-address*—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*—Number from 1 to 255.
- *protocol*—A predefined protocol (**basic** or **sdlc**) or a protocol that you define.
- **sdlc-tg**—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
```

8.5 STUN Interface Subcommands

[**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.

- *address*—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.

Example
```
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.

- *IP-address*—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.

- *interface-number*—Serial line number connected to the router.

- **address**—Specifies how an SDLC frame that contains a particular address is to be propagated.

- **local-ack**—Sets up SDLC Local Acknowledgment for a serial tunnel.

- **direct**—Indicates that the specified interface is a direct STUN link, not a serial connection to another peer.

- **priority**—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
```

8.6 STUN Show Commands

Command	Description
show stun	Current status of STUN.
show stun sdlc	Proxy state of interfaces on an address-by-address basis.

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