



DECnet Commands

Digital Equipment Corporation developed the DECnet protocol to provide a way for its computers to communicate with one another. Currently in its fifth major product release, DECnet Phase V is a superset of the Open System Interconnection (OSI) protocol suite, supports all OSI protocols, and is compatible with the previous release (Phase IV). DECnet Phase IV Prime supports inherent MAC addresses, which allow DECnet nodes to coexist with systems running other protocols that have MAC address restrictions. DECnet support on Cisco routers includes local-area and wide-area DECnet Phase IV routing over Ethernet, Token Ring, FDDI, and serial lines such as X.25, Frame Relay, and Switched Multimegabit Data Service (SMDS).

Use the commands in this chapter to configure and monitor DECnet networks. For DECnet protocol configuration information and examples, refer to the “Configuring DECnet” chapter of the *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide*.



Note

Not all Cisco access servers support DECnet. For more information, refer to the release notes for the current Cisco IOS release.

access-list (DECnet extended)

To create an extended access list, use the **access-list** command in global configuration mode. To delete the entire access list, use the **no** form of this command.

access-list *access-list-number* { **permit** | **deny** } *source source-mask* [*destination destination-mask*]

no access-list

Syntax Description	
<i>access-list-number</i>	Integer you choose between 300 and 399 that uniquely identifies the access list.
permit	Permits access when there is an address match.
deny	Denies access when there is an address match.
<i>source</i>	Source address. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All addresses are in decimal.
<i>source-mask</i>	Mask to be applied to the address of the source node. All masks are in decimal.
<i>destination</i>	(Optional) Destination node's DECnet address in decimal format. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50.
<i>destination-mask</i>	(Optional) Destination mask. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All masks are in decimal.

Defaults No access list is defined.

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example configures access list 301 to allow traffic from any host in networks 1 and 3. It implies no other traffic is permitted. (The end of a list contains an implicit “deny all else” statement.)

```
access-list 301 permit 1.0 0.1023 0.0 63.1023
access-list 301 permit 3.0 0.1023 0.0 63.1023
```

Related Commands	Command	Description
	access-list (connect initiate)	Creates an access list that filters connect initiate packets.
	access-list (DECnet standard)	Creates a standard access list.
	decnet access-group	Creates a DECnet access group.
	decnet in-routing-filter	Provides access control to hello messages or routing information received on an interface.
	decnet out-routing-filter	Provides access control to routing information being sent out on an interface.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

access-list (connect initiate)

To create an access list that filters *connect initiate* packets, use this version of the **access-list** command in global configuration mode. To disable the access list, use the **no** form of this command.

```
access-list access-list-number {permit | deny} source source-mask
    [destination destination-mask] {eq | neq} [[source-object] [destination-object]
    [identification] any]
```

no access-list

The optional argument *source-object* consists of the following string:

```
src [{eq | neq | gt | lt} object-number] [exp regular-expression] [uic [group, user]]
```

The optional argument *destination-object* consists of the following string:

```
dst [{eq | neq | gt | lt} object-number] [exp regular-expression] [uic [group, user]]
```

The optional argument *identification* consists of the following string:

```
[id regular-expression] [password regular-expression] [account regular-expression]
```

Syntax Description

<i>access-list-number</i>	Integer you choose between 300 and 399 that uniquely identifies the access list.
permit	Permits access when there is an address match.
deny	Denies access when there is an address match.
<i>source</i>	Source address. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All addresses are in decimal.
<i>source-mask</i>	Mask to be applied to the address of the source node. All masks are in decimal.
<i>destination</i>	(Optional) Destination node's DECnet address in decimal format. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All addresses are in decimal.
<i>destination-mask</i>	(Optional) Destination mask. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All masks are in decimal.
eq neq	Use either of these keywords: <ul style="list-style-type: none"> eq—Item matches the packet if <i>all</i> the specified parts of <i>source-object</i>, <i>destination-object</i>, and <i>identification</i> match data in the packet. neq—Item matches the packet if <i>any</i> of the specified parts do <i>not</i> match the corresponding entry in the packet.

<i>source-object</i>	<p>(Optional) Contains the mandatory keyword src and one of the following optional keywords:</p> <ul style="list-style-type: none"> • eq neq lt gt—Equal to, not equal to, less than, or greater than. These keywords must be followed by the argument <i>object-number</i>, a numeric DECnet object number. • exp—Stands for expression; followed by a <i>regular-expression</i> that matches a string. See the “Regular Expressions” appendix in the <i>Cisco IOS Dial Solutions Command Reference</i> for a description of regular expressions. • uic—Stands for user identification code; followed by a numeric user ID (UID) expression. The argument [<i>group, user</i>] is a numeric UID expression. In this case, the bracket symbols are literal; they must be entered. The <i>group</i> and <i>user</i> parts can either be specified in decimal, in octal by prefixing the number with a 0, or in hex by prefixing the number with 0x. The uic expression displays as an octal number.
<i>destination-object</i>	<p>(Optional) Contains the mandatory keyword dst and one of the following optional keywords:</p> <ul style="list-style-type: none"> • eq neq lt gt—Equal to, not equal to, less than, or greater than. These keywords must be followed by the argument <i>object-number</i>, a numeric DECnet object number. • exp—Stands for expression; followed by a <i>regular-expression</i> that matches a string. See the “Regular Expressions” appendix in the <i>Cisco IOS Dial Solutions Command Reference</i> for a description of regular expressions. • uic—Stands for user identification code; followed by a numeric user ID (UID) expression. In this case, the bracket symbols are literal; they must be entered. The <i>group</i> and <i>user</i> parts can either be specified in decimal, in octal by prefixing the number with a 0, or in hex by prefixing the number with 0x. The uic expression displays as an octal number.
<i>identification</i>	<p>(Optional) Uses any of the following three keywords:</p> <ul style="list-style-type: none"> • id—Regular expression; refers to user ID. • password—Regular expression; the password to the account. • account—Regular expression; the account string.
any	<p>(Optional) Item matches if <i>any</i> of the specified parts <i>do</i> match the corresponding entries for <i>source-object</i>, <i>destination-object</i>, or <i>identification</i>.</p>

Defaults

No access list is defined.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Depending upon the arguments you use, you can define access lists in three ways:

- Restrict access based on source addresses
Use the *source* and *source-mask* arguments only.
- Restrict access based on destination addresses
Use the *source*, *source-mask*, *destination*, and *destination-mask* arguments.
- Add filters to further narrow access
Use the *source*, *source-mask*, *destination*, and *destination-mask* arguments, the **eq**, **neq**, or **any** keywords and any or all of the following arguments: *source-object*, *destination-object*, and *identification*.

Table 20 lists the DECnet object numbers.

Table 20 Common DECnet Object Numbers

Name	Number	Description
FAL	17	File Access Listener
HLD	18	Host Loader
NML	19	Network Monitor Link/NICE
MIRROR	25	Loopback mirror
EVL	26	Event logger
MAIL	27	Mail
PHONE	29	Phone
NOTES	33	VAX Notes
CTERM	42	Terminal sessions
DTR	63	DECnet Test Sender/Receiver

Examples

The following example illustrates an access list for matching all connect packets for object number 27:

```
access-list 300 permit 0.0 63.1023 eq dst eq 27
```

The following example illustrates an access list for matching all connect packets *except* for the object number 17:

```
access-list 300 permit 0.0 63.1023 neq dst eq 17
```

The following example illustrates an access list for matching all connect packets where the access identification was *SYSTEM*:

```
access-list 300 permit 0.0 63.1023 eq id ^SYSTEM$
```

The following example illustrates an access list for matching all connect packets from area 1 to object number 27(27 = VAX/VMS Personal Utility or MAIL) where *SYSTEM* is the originating user:

```
access-list 300 permit 1.0 0.1023 eq src exp ^SYSTEM$ dst eq 27
```

The following example illustrates an access list for matching any connect packet and can be used at the end of a list to permit any packets not already matched:

```
access-list 300 permit 0.0 63.1023 eq any
```

Related Commands

Command	Description
access-list (DECnet extended)	Creates an extended access list.
access-list (DECnet standard)	Creates a standard access list.
decnet access-group	Creates a DECnet access group.
decnet in-routing-filter	Provides access control to hello messages or routing information received on an interface.
decnet out-routing-filter	Provides access control to routing information being sent out on an interface.
show decnet interface	Displays the global DECnet status and configuration for all interfaces.

access-list (DECnet standard)

To create a standard access list, use the standard version of the **access-list** command in global configuration mode. To delete the entire access list, use the **no** form of this command.

access-list *access-list-number* { **permit** | **deny** } *source source-mask*

no access-list

Syntax Description	
<i>access-list-number</i>	Integer you choose between 300 and 399 that uniquely identifies the access list.
permit	Permits access when there is an address match.
deny	Denies access when there is an address match.
<i>source</i>	Source address. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All addresses are in decimal.
<i>source-mask</i>	Mask to be applied to the address of the source node. Bits are set wherever the corresponding bits in the address should be ignored. All masks are in decimal.

Defaults No access list is defined.

Command Modes Global configuration

Command History	Release	Modification
	10.3	This command was introduced.

Usage Guidelines In contrast with IP masks, a DECnet mask specification of “all ones” is entered as the decimal value 1023. In IP, the equivalent is 255.

Examples The following example sets up access list 300 to deny packets coming from node 4.51 and permit packets coming from 2.31:

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

Related Commands	Command	Description
	access-list (DECnet extended)	Creates an extended access list.
	access-list (connect initiate)	Creates an access list that filters connect initiate packets.
	decnet access-group	Creates a DECnet access group.
	decnet in-routing-filter	Provides access control to hello messages or routing information received on an interface.
	decnet out-routing-filter	Provides access control to routing information being sent out on an interface.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

clear decnet accounting

To delete all entries in the accounting database when DECnet accounting is enabled, use the **clear decnet accounting** command in EXEC mode.

clear decnet accounting [**checkpoint**]

Syntax Description

checkpoint (Optional) Clears the checkpoint database.

Command Modes

EXEC

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Specifying the **clear decnet accounting** command without the **checkpoint** keyword copies the active database to the checkpoint database and clears the active database.

The active data set is copied to the checkpoint database; the active database entry values are reset to zero. If there are entries in the database that were found dynamically, they are deleted. If there are entries that were entered statically, such as decnet accounting list 5.3.17.26, they are not removed. Their values are reset to zero.

Any traffic that traverses the router after the **clear decnet accounting** command has been issued is saved in the active database. Accounting information in the checkpoint database at that time reflects traffic prior to the most recent **clear decnet accounting** command.

You can also delete all entries in both the active and the checkpoint databases by issuing the **clear decnet accounting** command twice in succession.

Examples

In the following example, the first display from the **show decnet accounting** command shows the active database before a clear command is issued. The clear decnet accounting command is issued and a second show display shows no accounting information in the active database. The display from the **show decnet accounting checkpoint** command shows the data collected in the active database prior to the **clear decnet accounting** command.

```
Router# show decnet accounting

Source DestinationBytesPackets
2.32937.41536
5.77.83264
27.10027.1071455
7.85.715212
27.10727.1005005
37.42.329784

Accounting data age is 12.41

Router# clear decnet accounting
Router# show decnet accounting

Source DestinationBytesPackets

Accounting data age is 0
Router# show decnet accounting checkpoint

Source DestinationBytesPackets
2.32937.41536
5.77.83264
27.10027.1071455
7.85.715212
27.10727.1005005
37.42.329784

Accounting data age is 12.41
```

Related Commands

Command	Description
decnet accounting	Enables DECnet accounting.
decnet accounting list	Specifies the source and destination address pairs for which DECnet accounting information is kept.
decnet accounting threshold	Sets the maximum number of accounting database entries.
decnet accounting transits	Sets the maximum number of transit entries that will be stored in the DECnet accounting database.
show decnet accounting	Displays the active accounting or checkpointed database.

clear decnet counters

To clear DECnet counters that are shown in the output of the **show decnet traffic** EXEC command, use the **clear decnet counters** command in EXEC mode.

clear decnet counters

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example zeros all DECnet counters:

```
clear decnet counters
```

Related Commands	Command	Description
	show decnet traffic	Shows the DECnet traffic statistics (including datagrams sent, received, and forwarded).

decnet access-group

To create a DECnet access group, use the **decnet access-group** command in interface configuration mode.

decnet access-group *access-list-number*

Syntax Description	<i>access-list-number</i>	Either a standard or extended DECnet access list. A standard DECnet access list applies to source addresses. The value (or values in the case of extended lists) can be in the range 300 to 399.
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Defaults No access group is defined.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example applies access list 389 to Ethernet interface 1:

```
interface ethernet 1
 decnet access-group 389
```

Related Commands	Command	Description
	access-list (DECnet standard)	Creates a standard access list.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet accounting

To enable DECnet accounting, use the **decnet accounting** command in interface configuration mode. To disable DECnet accounting, use the **no** form of this command.

decnet accounting

no decnet accounting

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

Usage Guidelines

The Cisco IOS software maintains two accounting databases: an active database and a checkpoint database. The active database contains accounting data tracked until the database is cleared. When the active database is cleared, its contents are copied to the checkpoint database. Using these two databases together allows you to monitor both current traffic and traffic which has previously traversed the router.

DECnet accounting statistics will be accurate, even if DECnet fast switching is enabled, or if DECnet access lists are being used.

Enabling DECnet accounting significantly decreases the performance of a fast-switched interface.

DECnet accounting is disabled if autonomous or SSE switching is enabled.

Examples This example shows DECnet accounting enabled on a serial interface 0:

```
interface serial 0
  decnet accounting
```

Related Commands

Command	Description
clear decnet accounting	Deletes all entries in the accounting database when DECnet accounting is enabled.
decnet accounting list	Specifies the source and destination address pairs for which DECnet accounting information is kept.
decnet accounting threshold	Sets the maximum number of accounting database entries.
decnet accounting transits	Sets the maximum number of transit entries that will be stored in the DECnet accounting database.
show decnet accounting	Displays the active accounting or checkpointed database.

decnet accounting list

To specify the source and destination address pairs for which DECnet accounting information is kept, use the **decnet accounting list** command in global configuration mode. DECnet accounting tracks all traffic that traverses the router between the source and destination address pairs specified with this command. To remove the accounting filter, use the **no** form of this command.

decnet accounting list *src-dec-address dest-dec-address*

no decnet accounting list {*src-dec-address dest-dec-address* | **all**}

Syntax Description		
	<i>src-dec-address</i>	DECnet address for the source. The address is in the form <i>area.node</i> , for example, 5.3.
	<i>dest-dec-address</i>	DECnet address for the destination. The address is in the form <i>area.node</i> , for example, 5.3.
	all	Disables DECnet accounting for all source and destination address pairs specified previously with the decnet accounting list command.

Defaults No filters are predefined.

Command Modes Global configuration

Command History	Release	Modification
	11.2 F	This command was introduced.

Usage Guidelines The source and destination addresses of each DECnet packet are paired to create an entry in the database. When DECnet traffic traverses the router and a match is found, accounting information about the DECnet packet is entered into the accounting database. If DECnet accounting is enabled on an interface, but no accounting list is specified, the transit parameter does not come into play. DECnet accounting will track all traffic through the interface, up to the accounting threshold limit. All traffic up to the threshold limit is collected and added to the aggregate value for all DECnet traffic passing through the router.

Use the **no decnet accounting list all** to delete the entire entry list.

Examples The following example adds DECnet host pair 5.37 and 6.126 to the list of networks for which accounting information is kept:

```
decnet accounting list 5.37 6.126
```

Related Commands	Command	Description
	clear decnet accounting	Deletes all entries in the accounting database when DECnet accounting is enabled.
	decnet accounting	Enables DECnet accounting.
	decnet accounting threshold	Sets the maximum number of accounting database entries.
	decnet accounting transits	Sets the maximum number of transit entries that will be stored in the DECnet accounting database.
	show decnet accounting	Displays the active accounting or checkpointed database.

decnet accounting threshold

To set the maximum number of accounting database entries, use the **decnet accounting threshold** command in global configuration mode. To restore the default, use the **no** form of this command.

decnet accounting threshold *threshold*

no decnet accounting threshold *threshold*

Syntax Description	<i>threshold</i>	Maximum number of entries (source and destination address pairs) that the Cisco IOS software can accumulate.
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Defaults	512 entries
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Command Modes	Global configuration
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Command History	Release	Modification
	11.2 F	This command was introduced.

Usage Guidelines	The accounting threshold defines the maximum number of entries (source and destination address pairs) that the software accumulates. The threshold is designed to prevent DECnet accounting from consuming all available free memory. This level of memory consumption could occur in a router that is switching traffic for many hosts. To determine whether overflows have occurred, use the show decnet accounting EXEC command.
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Examples	The following example sets the DECnet accounting database threshold to 256 entries:
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```
decnet accounting threshold 256
```

Related Commands	Command	Description
	clear decnet accounting	Deletes all entries in the accounting database when DECnet accounting is enabled.
	decnet accounting	Enables DECnet accounting.
	decnet accounting list	Specifies the source and destination address pairs for which DECnet accounting information is kept.
	decnet accounting transits	Sets the maximum number of transit entries that will be stored in the DECnet accounting database.
	show decnet accounting	Displays the active accounting or checkpointed database.

decnet accounting transits

To set the maximum number of transit entries that will be stored in the DECnet accounting database, use the **decnet accounting transits** command in global configuration mode. To disable this function, use the **no** form of this command.

decnet accounting transits *count*

no decnet accounting transits

Syntax Description	<i>count</i>	Number of transit entries that will be stored in the DECnet accounting database.
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Defaults	0 entries
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Command Modes	Global configuration
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Command History	Release	Modification
	11.2 F	This command was introduced.

Usage Guidelines

Transit entries are those that do not match any of the source and destination address pair filters specified by **decnet accounting list** global configuration commands. If an accounting list is not defined, DECnet accounting will track all traffic through the interface (all transit entries) up to the accounting threshold limit.

To maintain accurate accounting totals, the Cisco IOS software maintains two accounting databases: an active database and a checkpoint database.

Examples

The following example specifies a maximum of 100 transit records to be stored in the DECnet accounting database:

```
decnet accounting transits 100
```

Related Commands	Command	Description
	clear decnet accounting	Deletes all entries in the accounting database when DECnet accounting is enabled.
	decnet accounting list	Specifies the source and destination address pairs for which DECnet accounting information is kept.
	decnet accounting threshold	Sets the maximum number of accounting database entries.
	show decnet accounting	Displays the active accounting or checkpointed database.

decnet advertise

To configure border routers to propagate Phase IV areas through an OSI backbone, use the **decnet advertise** command in global configuration mode. To disable this function, use the **no** form of this command.

decnet advertise *decnet-area hops cost*

no decnet advertise [*decnet-area*]

Syntax Description

<i>decnet-area</i>	Phase IV area that you want propagated.
<i>hops</i>	Hop count to be associated with the route being advertised. Default is 0.
<i>cost</i>	Cost to be associated with the route being advertised. Default is 0.

Defaults

Disabled

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The output from the **show decnet route EXEC** command shows the cost and hop count for routes.

The **decnet advertise** command is used by border routers for propagating Phase IV areas through an OSI backbone.

The **decnet advertise** command and the **clns route nsap-prefix discard** command work together. When a router has DECnet Phase IV/V conversion enabled, any packet with the specified Connectionless Network Service (CLNS) Network Service Access Point (NSAP) prefix will cause CLNS to behave as if no route were found. That router then looks up the route to the border router that is advertising the Phase IV route. In turn, the router that is advertising the DECnet Phase IV route converts the packet to Phase V and sends it through the OSI cloud to the border router that is advertising the CLNS discard static route. After the packet gets to the border router, it is converted back to Phase IV.

The CLNS discard routes are created dynamically when the advertised adjacencies are propagated through the CLNS cloud. When a DECnet interface is disabled, the adjacencies are lost and the CLNS discard route is deleted. The DECnet area routing states are displayed in the output from the **show decnet route EXEC** command.

Examples

The following example shows a partial use of the **decnet advertise** command:

```
decnet conversion 49
decnet advertise 4
clns route 49.0001 discard
```

Related Commands

Command	Description
clns route discard	Explicitly tells a router to discard packets with NSAP addresses that match the specified nsap-prefix.
show decnet route	Displays the DECnet routing table.

decnet area-max-cost

To set the maximum cost specification value for *interarea* routing, use the **decnet area-max-cost** command in global configuration mode.

decnet [*network-number*] **area-max-cost** *value*

Syntax Description		
	<i>network-number</i>	(Optional) Network number from 0 to 3. Specified when using Address Translation Gateway (ATG). If not specified, the default is network 0.
	<i>value</i>	Maximum cost for a route to a distant area that the Cisco IOS software may consider usable; the software treats as unreachable any route with a cost greater than the value you specify. A valid range for cost is 1 to 1022. This parameter is only valid for area routers. The default is 1022.

Defaults	
	network-number: 0
	value: 1022

Command Modes	
	Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	
	Be sure that you have used the decnet node-type area global configuration command before using this command.

Examples	
	The following example specifies the node type as area and sets the maximum cost to 500. Any route with a cost exceeding 500 is considered unreachable by this router.

```
decnet node-type area
decnet area-max-cost 500
```

Related Commands	Command	Description
	decnet area-max-hops	Sets the maximum hop count value for interarea routing.
	decnet node-type	Specifies the node type.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet area-max-hops

To set the maximum hop count value for *interarea* routing, use the **decnet area-max-hops** command in global configuration mode.

decnet [*network-number*] **area-max-hops** *value*

Syntax Description		
	<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.
	<i>value</i>	Maximum number of hops for a usable route to a distant area. The Cisco IOS software treats as unreachable any route with a count greater than the value you specify. A valid range for the hop count is 1 to 30. The default is 30 hops.

Defaults 30 hops

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This command is only valid for area routers. Be sure that you have issued the **decnet node-type area** global configuration command before using this command.

Examples The following example sets the router to be a Level 2 router, then sets a maximum hop count of 21:

```
decnet node-type area
decnet area-max-hops 21
```

Related Commands	Command	Description
	decnet area-max-cost	Sets the maximum cost specification value for interarea routing.
	decnet node-type	Specifies the node type.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet cluster-holdtime

To set a holdtime for a cluster alias adjacency, use the **decnet cluster-holdtime** command in interface configuration mode. To restore the default, use the **no** form of this command.

decnet cluster holdtime *seconds*

no decnet cluster holdtime

Syntax Description	<i>seconds</i> (Required) Amount of time before the cluster alias adjacency times out.
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Defaults	300 seconds
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Command Modes	Interface configuration
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Command History	Release	Modification
	12.0(7) T	This command was introduced.

Usage Guidelines

When you have Phase IV VAX clusters and have enabled cluster aliases, you must ensure that the Phase IV VAX clusters are reachable by remote end systems. The Phase IV router will look for the L1 routing updates from the VAX machine that is acting as the gratuitous router for the VAX cluster, extracting the cluster alias from the update and injecting it into the Phase V cloud, thus allowing reachability to remote end systems. In order for updates to be accepted, the DECnet cluster holdtime must be set to a greater time than the VAX broadcast routing timer. Using the **decnet cluster-holdtime** command will allow you to ensure that the holdtime has been set to a time period greater than the VAX broadcast timer. The VAX broadcast timer will determine the rate at which entries are refreshed. To see the current setting of the **decnet cluster-holdtime** command, enter the **show decnet interface** command.

For additional information on configuring Phase IV-to-Phase IV conversion with VAX clusters, refer to the “Configuring DECnet” chapter of the *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide*.

Examples The following example sets a cost of 1 for the Ethernet interface 1/0 and a cluster time of 200 seconds:

```
decnet routing 21.456
interface ethernet 1/0
  decnet cost 1
  decnet cluster-holdtime 200
```

Related Commands	Command	Description
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet congestion-threshold

To set the congestion- experienced bit if the output queue has more than the specified number of packets in it, use the **decnet congestion-threshold** command in interface configuration mode. To remove the parameter setting and set it to 0, use the **no** form of this command.

decnet congestion-threshold *number*

no decnet congestion-threshold

Syntax Description	<i>number</i>	Number of packets that are allowed in the output queue before the system sets the congestion experience bit. This value is an integer between 0 and 0x7fff. The value zero prevents this bit from being set. Only relatively small integers are reasonable. The default is 1 packet.
---------------------------	---------------	--

Defaults	1 packet
-----------------	----------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	If a router configured for DECnet experiences congestion, it sets the congestion-experienced bit. A <i>number</i> value of zero or the no form of the command prevents this bit from being set.
-------------------------	--

Examples	The following example sets the congestion threshold to 10:
-----------------	--

```
interface ethernet 0
  decnet congestion-threshold 10
```

decnet conversion

To allow Phase IV routers (running Cisco Release 9.1 or higher) to run in a Phase V network and vice versa, enable conversion with the **decnet conversion** command in global configuration mode. To disable conversion, use the **no** form of this command.

decnet conversion *nsap-prefix*

no decnet conversion *nsap-prefix*

Syntax Description	<i>nsap-prefix</i>	Value used for the IDP field when constructing NSAPs from a Phase IV address.
---------------------------	--------------------	---

Defaults	Disabled
-----------------	----------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines

To enable DECnet conversion, you must configure both DECnet and ISO CLNS on your router.

DECnet Phase V is OSI-compatible and conforms to the ISO 8473 (CLNP/CLNS) and ISO 9542 (ES-IS) standards. Digital has defined algorithms for mapping a subset of the Phase V address space onto the Phase IV address space and for converting Phase IV and Phase V packets back and forth. This allows a network administrator to support both Phase IV hosts in Phase V networks and Phase V hosts in Phase IV networks.

Cisco's implementation differs from Digital's in how reachability information is advertised. Cisco's implementation allows you to add Phase V support without modifying your existing Phase IV support. It also delays converting packets from Phase IV to Phase V, while Digital's implementation converts as soon as possible.

It is essential that the area you specify in the **decnet routing** global configuration command is the same as the local area you specified with the **net** router configuration command for the CLNS network.

Be sure that the area you specify in the **decnet conversion** command is the same as the area you specified for the CLNS network. Also note that the DECnet area is specified in decimal, and the CLNS area is specified in hexadecimal.

The **decnet routing** command is specified with a decimal address, while the **net** command address is specified in hexadecimal. In addition, the *nsap-prefix* specified on the **decnet conversion** command must match one of the NETs for this router.

The following guidelines apply:

- Host connectivity across multiple areas is only possible if a Level 2 path exists for which every Level 2 router in the path supports a common protocol: Phase IV or Phase V. If not all routers support both protocols, those routers that do *must* have conversion enabled.
- Host connectivity across a single area is only possible if a Level 1 path exists for which every Level 1 router in the path supports a common protocol: Phase IV or Phase V. If not all routers support both protocols, those routers that do *must* have conversion enabled.
- The Level 2 backbone *must* have conversion enabled in all Level 2 routers that support an area that needs conversion.

Examples

The following example enables DECnet conversion on a router with the area tag *xy* and Phase IV address 20.401 using an ISO IGRP router:

```

clns routing
decnet routing 20.401
decnet max-address 600
!
router iso-igrp xy
 net 47.0004.004d.0014.aa00.0400.9151.00
!
decnet conversion 47.0004.004d
!
interface ethernet 0
 decnet cost 4
 clns router iso-igrp xy

```

Related Commands

Command	Description
net	Configures an IS-IS NET for the routing process.
show decnet interface	Displays the global DECnet status and configuration for all interfaces.
show decnet route	Displays the DECnet routing table.

decnet cost

To set a cost value for an interface, use the **decnet cost** command in interface configuration mode. To disable DECnet routing for an interface, use the **no** form of this command.

decnet cost *cost-value*

no decnet cost

Syntax Description	<i>cost-value</i>	Integer from 1 to 63. There is no default cost for an interface, although a suggested cost for FDDI is 1, for Ethernet is 4, and for serial links is greater than 10.
---------------------------	-------------------	---

Defaults	Disabled
-----------------	----------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	<p>The decnet cost command is required for all interfaces on which DECnet routing is configured.</p> <p>After DECnet routing has been enabled, you must assign a cost to each interface over which you want DECnet to run. Assigning a cost in effect enables DECnet routing for an interface. Most DECnet installations have an individualized routing strategy for using costs. Therefore, check the routing strategy used at your installation to ensure that costs you specify are consistent with those set for other hosts on the network.</p>
-------------------------	--

Examples	<p>The following example establishes a DECnet routing process for a router and sets the router's DECnet address to 21.456, then sets a cost of 4 for the Ethernet interface 0:</p>
-----------------	--

```
decnet routing 21.456
interface ethernet 0
  decnet cost 4
```

Related Commands	Command	Description
	decnet encapsulation	Provides DECnet encapsulation over Token Ring.
	decnet node-type	Specifies the node type.
	decnet routing	Enables DECnet routing.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.
	show decnet route	Displays the DECnet routing table.

decnet encapsulation

To provide DECnet encapsulation over Token Ring, use the **decnet encapsulation** command in interface configuration mode.

decnet encapsulation { **pre-dec** | **dec** }

Syntax Description	pre-dec	dec
	Configures routers for operation on the same Token Ring with routers running software versions prior to Cisco IOS Release 9.1. In this mode, Cisco routers cannot communicate with non-Cisco equipment. Referred to as Cisco-style encapsulation.	Provides encapsulation that is compatible with other Digital equipment. All Cisco routers must be running Cisco IOS Release 9.1 or later.

Defaults Encapsulation is compatible with other Digital equipment.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines If you have both Release 9.0 and 9.1 routers in the same network, you must use the **pre-dec** encapsulation type on the 9.1 routers.



Note

You must first enable DECnet routing on the selected Token Ring interface before you can configure the DECnet encapsulation mode.

Examples The following example sets Cisco-style encapsulation for DECnet routing, which means that Cisco and Digital equipment will not interoperate over Token Ring:

```
interface tokenring 0
  decnet encapsulation pre-dec
  decnet cost 4
```

Related Commands	Command	Description
	decnet cost	Sets a cost value for an interface.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet hello-timer

To change the interval for sending broadcast hello messages, use the **decnet hello-timer** command in interface configuration mode. To restore the default value, use the **no** form of this command.

decnet hello-timer *seconds*

no decnet hello-timer

Syntax Description	<i>seconds</i>	Interval at which the Cisco IOS software sends hello messages. It can be a decimal number in the range 1 to 8191 seconds. The default is 15 seconds.
---------------------------	----------------	--

Defaults	15 seconds
-----------------	------------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	The Cisco IOS software broadcasts hello messages on all interfaces with DECnet enabled. Other hosts on the network use the hello messages to identify the hosts with which they can communicate directly. On extremely slow serial lines, you may want to increase the default value to reduce overhead on the line.
-------------------------	--

Examples	The following example increases the hello interval to 2 minutes (120 seconds) on serial interface 1: <pre>interface serial 1 decnet hello-timer 120</pre>
-----------------	--

Related Commands	Command	Description
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet host

To associate a name-to-DECnet address mapping, use the **decnet host** command in global configuration mode. To disable name mapping, use the **no** form of this command.

decnet host *name decnet-address*

no decnet host *name*

Syntax Description	<i>name</i>	A name you choose that uniquely identifies this DECnet address.
	<i>decnet-address</i>	Source address. DECnet addresses are written in the form <i>area.node</i> . For example, 50.4 is node 4 in area 50. All addresses are in decimal.

Defaults No name is defined.

Command Modes Global configuration

Command History	Release	Modification
	10.3	This command was introduced.

Usage Guidelines The assigned name is displayed, where applicable, in **show decnet route** and **show hosts EXEC** command output.

The name can also be used with the **ping decnet** command.

Examples The following example defines name-to-DECnet address mapping:

```
decnet host cisco1 3.33
```

Related Commands	Command	Description
	show decnet	Displays the global DECnet parameters.
	show decnet route	Displays the DECnet routing table.
	show hosts	Displays the default domain name, the style of name lookup service, a list of name server hosts, and the cached list of host names and addresses.

decnet in-routing-filter

To provide access control to hello messages or routing information received on an interface, use the **decnet in-routing-filter** command in interface configuration mode. To remove access control, use the **no** form of this command.

decnet in-routing-filter *access-list-number*

no decnet in-routing-filter

Syntax Description	<i>access-list-number</i>	Standard DECnet access list. This list applies to source addresses. The value can be in the range 300 to 399.
---------------------------	---------------------------	---

Defaults	No access control is defined.
-----------------	-------------------------------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Examples

The following example sets up Ethernet interface 0 with a DECnet in-routing filter of 321, which means that any hello messages sent from addresses that are denied in list 321 are ignored. Additionally, all node addresses listed in received routing messages on this interface are checked against the access list, and only routes passing the filter are considered usable.

```
interface ethernet 0
  decnet in-routing-filter 321
```

Related Commands	Command	Description
	access-list (DECnet standard)	Creates a standard access list.
	decnet out-routing-filter	Provides access control to routing information being sent out on an interface.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet map

To establish an address translation for selected nodes, use the **decnet map** command in global configuration mode.

```
decnet first-network map virtual-address second-network real-address
```

Syntax Description	
<i>first-network</i>	DECnet network numbers in the range 0 to 3.
<i>virtual-address</i>	Numeric DECnet address (10.5, for example).
<i>second-network</i>	DECnet network number you map to; DECnet numbers range 0 to 3.
<i>real-address</i>	Numeric DECnet address (10.5, for example).

Defaults No address translation is defined.

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines Keep the following limitations in mind when configuring the address translation gateway (ATG):

- Both nodes that want to communicate across the ATG must exist in the translation map. Other nodes outside of the map will see route advertisements for the mapped address, but will be unable to communicate with them. An unmapped node trying to communicate with a mapped node will always get the message, “Node unreachable.” This can be confusing if another nearby node can communicate with mapped nodes because it is also a mapped node.
- Third-party DECnet applications could fail if they pass node number information in a data stream (most likely a sign of a poorly designed application).
- Routing information for mapped addresses is static and does not reflect the reachability of the actual node in the destination network.

As an additional feature and security caution, DECnet “Poor Man’s Routing” can be used between nodes outside of the translation map as long as those nodes have access to nodes that are in the map, so that a user on node B could issue the following VMS command:

```
$ dir A::D::E::
```

When a Poor Man’s Routing connection is made between two networks, only the two adjacent nodes between the networks will have any direct knowledge about the other network. Application-level network access may then be specified to route through the connection.



Note

Cisco does not support “Poor Man’s Routing” directly; the intermediate nodes must be VMS systems with “Poor Man’s Routing” enabled in file-access language.

Examples

In the following example, packets in network 0 sent to address 19.5 will be routed to network 1, and the destination address will be translated to 50.1. Packets sent to address 47.1 in network 1 will be routed to network 0 as 19.1.

```
decnet 0 map 19.5 1 50.1
decnet 1 map 47.1 0 19.1
```

Related Commands

Command	Description
show decnet map	Displays the address mapping information used by the DECnet Address Translation Gateway.

decnet max-address

To configure the Cisco IOS software with a maximum number of node addresses, use the **decnet max-address** command in global configuration mode.

decnet [*network-number*] **max-address** *value*

Syntax Description		
<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.	
<i>value</i>	A number less than or equal to 1023 that represents the maximum address possible on the network. In general, all routers on the network should use the same value for this argument. The default is 1023.	

Defaults 1023 node addresses

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines DECnet routers do not have the concept of aging out a route. Therefore, all possible areas or nodes must be advertised as unreachable if they cannot be reached. Since it is best to keep routing updates small, you must indicate the default maximum possible node and area numbers that can exist in the network.

Examples The following example configures a small network to a maximum address value of 300:

```
decnet max-address 300
```

Related Commands	Command	Description
	decnet max-area	Sets the largest number of areas that the Cisco IOS software can handle in its routing table.

decnet max-area

To set the largest number of areas that the Cisco IOS software can handle in its routing table, use the **decnet max-area** command in global configuration mode.

```
decnet [network-number] max-area area-number
```

Syntax Description		
	<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.
	<i>area-number</i>	Area number from 1 to 63. Like the decnet max-address global configuration command value, this argument controls the sizes of internal routing tables and of messages sent to other nodes. All routers on the network should use the same maximum address value. The default is 63.

Defaults	
	63 areas

Command Modes	
	Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples	
	In the following example, the largest area to be stored in the routing table is 45:

```
decnet max-area 45
```

Related Commands	Command	Description
	decnet max-address	Configures the Cisco IOS software with a maximum number of node addresses.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet max-cost

To set the maximum cost specification for *intra-area* routing, use the **decnet max-cost** command in global configuration mode.

```
decnet [network-number] max-cost cost
```

Syntax Description	
<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.
<i>cost</i>	Cost from 1 to 1022. The default is 1022.

Defaults 1022

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines The Cisco IOS software ignores routes within its local area that have a cost greater than the value you specify.

Examples The following example specifies the node type as a Level 1 router and sets the maximum cost to 335. Any route whose cost exceeds 335 is considered unreachable by this router.

```
decnet node-type routing-iv
decnet max-cost 335
```

Related Commands	Command	Description
	decnet max-hops	Sets the maximum hop count specification value for intra-area routing.
	decnet max-paths	Defines the maximum number of equal-cost paths to a destination that the Cisco IOS software keeps in its routing table.
	decnet node-type	Specifies the node type.
	decnet path-split-mode	Specifies how the Cisco IOS software splits the routable packets between equal-cost paths.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

decnet max-hops

To set the maximum hop count specification value for *intra-area* routing, use the **decnet max-hops** command in global configuration mode.

decnet [*network-number*] **max-hops** *hop-count*

Syntax Description		
	<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.
	<i>hop-count</i>	Hop count from 1 to 30. The Cisco IOS software ignores routes that have a hop count greater than the corresponding value of this parameter. The default is 30 hops.

Defaults 30 hops

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example sets the router to be a Level 1 router, then sets a maximum hop count of 2:

```
decnet node-type routing-iv
decnet max-hops 2
```

Related Commands	Command	Description
	decnet max-cost	Sets the maximum cost specification for intra-area routing.
	decnet max-paths	Defines the maximum number of equal-cost paths to a destination that the Cisco IOS software keeps in its routing table.
	decnet node-type	Specifies the node type.

decnet max-paths

To define the maximum number of equal-cost paths to a destination that the Cisco IOS software keeps in its routing table, use the **decnet max-paths** command in global configuration mode.

decnet [*network-number*] **max-paths** *value*

Syntax Description		
<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.	
<i>value</i>	Decimal number equal to the maximum number of equal-cost paths the software will save. The valid range is 1 to 31. The default is 1.	

Defaults 1 equal-cost path

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines Limiting the number of equal-cost paths can save memory on routers with limited memory or very large configurations. Additionally, in networks with a large number of multiple paths and end-systems with limited ability to cache out-of-sequence packets, performance may suffer when traffic is split between many paths.

Limiting the size of the routing table does not affect your routers' ability to recover from network failures transparently, provided that you do not make the maximum number of paths too small. If more than the specified number of equal-cost paths exist, and one of those paths suddenly becomes unusable, the software will discover an additional path from the paths it has been ignoring.

Examples In the following example, the software will save no more than three equal-cost paths:

```
decnet max-paths 3
```

Related Commands	Command	Description
	decnet max-cost	Sets the maximum cost specification for intra-area routing.
	decnet max-hops	Sets the maximum hop count specification value for intra-area routing.
	decnet path-split-mode	Specifies how the Cisco IOS software splits the routable packets between equal-cost paths.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.
	show decnet route	Displays the DECnet routing table.

decnet max-visits

To set the limit on the number of times a packet can pass through a router, use the **decnet max-visits** command in global configuration mode.

decnet [*network-number*] **max-visits** *value*

Syntax Description	<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.
	<i>value</i>	Number of times a packet can pass through a router. It can be a decimal number in the range 1 to 63. If a packet exceeds <i>value</i> , the Cisco IOS software discards the packet. Digital recommends that the value of the max-visits parameter be at least twice that of the max-hops parameter, to allow packets to still reach their destinations when routes are changing. The default is 63 times.

Defaults 63 times

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example of intra-area routing configuration specifies Level 1 routing, a maximum hop count of 28, and maximum number of visits of 62 (which is more than twice 28):

```
decnet node-type routing-iv
decnet max-hops 28
decnet max-visits 62
```

Related Commands	Command	Description
	decnet max-hops	Sets the maximum hop count specification value for intra-area routing.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.
	show decnet traffic	Shows the DECnet traffic statistics (including datagrams sent, received, and forwarded).

decnet multicast-map

To specify a mapping between DECnet multicast addresses and Token Ring functional addresses, other than the default mapping, use the **decnet multicast-map** command in interface configuration mode. To delete the specified information, use the **no** form of this command.

decnet multicast-map *multicast-address-type functional-address*

no decnet multicast-map *multicast-address-type functional-address*

Syntax Description		
	<i>multicast-address-type</i>	Type of multicast address that is used. The following are valid values for the argument: <ul style="list-style-type: none"> • iv-all-routers (All Phase-IV routers) • iv-all-endnodes (All Phase-IV end nodes) • iv-prime-all-routers (All Phase IV Prime routers)
	<i>functional-address</i>	Functional MAC address to which this multicast ID maps; in the form of "c000.xxxx.yyyy."

Defaults Enabled, with the default mapping listed in Table 21.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This command is valid for Token Ring interfaces only. The command will reject a functional address that does not start with "C000" or "c000."

Routing multicasts and end node multicasts must be on different functional addresses. Table 21 shows the default mapping of DECnet multicast address types to token ring functional addresses.

Table 21 *Default Mapping of DECnet Multicast Address Types and Token Ring Functional Addresses*

DECnet Multicast Address Type	Token Ring Functional Address
L1 router	C000.1000.0000
L2 router	
End node	C000.0800.0000
DECnet Phase IV-Prime router	C000.1000.0000

Examples

The following example configures Token Ring interface 1 for multicasts of all Phase IV end nodes and the multicast ID is configured to map to MAC address c000.2222.3333:

```
interface tokenring 1
  decnet multicast-map iv-all-endnodes c000.2222.3333
```

decnet node-type

To specify the node type, use the **decnet node-type** command in global configuration mode.

```
decnet [network-number] node-type {area | routing-iv}
```

Syntax Description		
<i>network-number</i>	(Optional) Network number in the range 0 to 3. Specified when using ATG. If not specified, the default is network 0.	
area	Router participates in the DECnet routing protocol with other area routers, as described in the Digital documentation, and routes packets from and to routers in other areas. This is sometimes referred to as Level 2 (or interarea) routing. An area router does not just handle interarea routing, it also acts as an intra-area or Level 1 router in its own area.	
routing-iv	Router acts as an intra-area (standard DECnet Phase IV, Level 1 router) and ignores Level 2 routing packets. In this mode, it routes packets destined for other areas to a designated interarea router, exchanging packets with other end nodes and routers in the same area.	

Defaults No node type is specified.

Command Modes Global configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples In the following example, the router node type is specified as **area**, or Level 2:

```
decnet node-type area
```

Related Commands	Command	Description
	decnet cost	Sets a cost value for an interface.
	decnet routing	Enables DECnet routing.
	show decnet interface	Displays the global DECnet status and configuration for all interfaces.

